Advance Data

BIRTHS 1998

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Technical Foreword: Changes in *Advance Data: Births 1998*

There are four changes in ***Advance Data: Births 1998***: 1) more detailed ethnicity/ancestry data are presented this year; 2) modifications to the calculation of adequacy of prenatal care (also known as the Kessner Index) have been made; 3) updated Massachusetts population data are used; and 4) additional information on birth characteristics according to maternal education has been added to this year's publication.

Race/Ethnicity: In ***Advance Data: Births 1998*** we have greatly expanded the birth information on detailed ethnicity/ancestry groups. Table 2B presents data on perinatal characteristics for 20 ethnicity groups. Furthermore, we have provided detailed data on foreign- and U.S.-born mothers by race in Table 2A. We have slightly modified the assignment of race and ethnicity categories to more accurately reflect mothers' actual responses. Self-reported information is used for all races and ethnicity groups. (Mothers who identify themselves as Hispanic are classified as Hispanic regardless of any additional race information that they provide.) We have separated race data (Table 2A) from ethnicity/ancestry data (2B) for the readers' convenience. Please note that the detailed ethnicity categories may not sum to the broad race categories: for example, women who selected detailed ethnicity groups such as Chinese or Japanese may also identify any race group--Asian, white, or other.

Adequacy of Prenatal Care: In 1996, Massachusetts implemented a major revision to the birth certificate form and installed a new Electronic Birth Certificate (EBC) system in Massachusetts maternity hospitals.[1] As a result, Massachusetts' natality data after 1995 afford public health researchers, program planners, the health care community, and the public vastly expanded information. However, the transition to the new format affected several data elements. In particular, information on adequacy of prenatal care for the years 1996 and following cannot be directly compared to data for preceding years. This year's publication reflects an additional computational adjustment in the calculation of adequacy of prenatal care to make Massachusetts data more comparable to the calculations recommended by the National Center for Health Statistics. This new calculation reduces the number of unknowns. Adequacy of prenatal care has been recalculated for 1996, 1997, and 1998. These numbers will differ slightly from previously published data.

New Population Data: The Massachusetts Institute for Social and Economic Research (MISER) is the official Massachusetts state data center. MISER has completed final population

[1] Beginning in 1996, the collection of data for calculation of the Kessner Adequacy Index differed from previous years. From 1986 to 1995, data elements for use in calculating the adequacy index were as follows: Number of Prenatal Visits (NPV), adjusted by birthweight for premature infants, and Month of Pregnancy that Prenatal Care Began (MPPCB), coded as 1-9. Hospitals were required to calculate the MPPCB from data available in medical and prenatal records. Since 1996, the data elements for use in calculating the adequacy index are still NPV and MPPCB (1-9). However, currently, NPV is adjusted by the clinical estimate of gestation for premature infants rather than by birthweight. Secondly, rather than have individual hospitals make determinations of MPPCB, the new birth certificate asks hospitals to report the precise Date of First Prenatal Care Visit (DFPCV). This increases the consistency of data collection across facilities and yields a more standardized calculation of MPPCB. Rather unexpectedly, MPPCB in 1996 showed a marked decline in first trimester visits when DFPCV was used to determine the month as opposed to hospitals reporting just the month. When comparing the adequacy index for 1995 and 1996 or 1997, there is almost universal decline in state and hospital adequacy rates. This decline is unlikely to reflect a significant actual decline, but rather a data adjustment due to more accurate data collection in 1996 and 1997.

estimates for 1991-1997 by age, race, and gender at the community level. These population estimates are used in this publication. Birth rates for all years after 1990 reflect these changes. The 1998 birth rate is calculated using the 1997 MISER population estimates, the latest year of data available. All future Advance Data publications will use the latest MISER figures available for intercensal estimates. As a result of using the updated population estimates, there may be differences from previously published data for crude and age-specific birth rates for 1991-1997, especially for teen birth rates. (The final MISER population estimates for the female population age 15-19 years are higher than previously estimated. Therefore, most community teen birth rates are lower than previously reported. *See TECHNICAL NOTES in the Appendix for a detailed explanation.*)

Birth Characteristics by Maternal Education: In this year's publication, Table 7 provides information on birth characteristics by maternal education. Data are presented for the following maternal educational categories: less than high school, high school graduates, some college, college graduates, and more than college.

We apologize for any inconvenience these changes might cause. Ultimately, we feel these modifications will greatly enhance the quality, completeness, depth, and utility of the birth certificate data and this publication.

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EXECUTIVE SUMMARY

Highlights

In 1998, 81,406 infants were born to women residing in Massachusetts, a 12% increase in the number of births since 1980, but a 12% decrease since 1990. In 1998, 75.9% of Massachusetts births were to white non-Hispanic women, 10.6% to Hispanic women, 6.8% to black non-Hispanic women and 4.6% to Asian women.

The majority of births were to women over age 30 years. The birth rate among teenagers (ages 15-19) in 1998 remained almost the same as that of 1996 and 1997, while it declined for women in their 20s. The fastest growing age-specific birth rates in the 1990s were for women ages 40 years and above.

The infant mortality rate (IMR) was 5.1 per 1,000 live births in 1998, representing a 4% decrease from 5.3 per 1,000 in 1997. Black non-Hispanic mothers continue to have the highest IMR -- 10.6 deaths per 1,000 live births, down 9% from 1997. The IMR was 4.6 deaths per 1,000 live births for white non-Hispanics, a 4% decrease from the 1997 rate. The IMR for Hispanics was unchanged from 1997: 6.7 per 1,000 live births. These patterns should be monitored to see whether they represent trends or merely year-to-year fluctuations.

Although it is difficult to examine trends in adequacy of prenatal care due to changes in data recorded on the birth certificate and calculation adjustments of the Kessner Index, women in some of the larger, urban communities such as Lawrence, Brockton, Springfield, Lowell and Worcester had much lower rates of adequate prenatal care services than the statewide average. (For a woman to be included in the “adequate” prenatal care category, she must have begun prenatal care during her first three months of pregnancy and have received at least nine prenatal care visits - assuming a full term delivery. Please see the Technical Foreword for more information about the changes in birth certificate data collection and calculation adjustments of the Kessner Index.)

The Cesarean section delivery rate among Massachusetts residents has declined from 22.4% of live births in 1990 to 20.9% in 1998. Furthermore, 32.7% of women with a previous Cesarean section had a vaginal birth after Cesarean section delivery (VBAC), up from 22.3% in 1990.

Many women smokers stopped smoking or decreased their daily consumption of cigarettes during pregnancy. Among women who smoked prior to becoming pregnant, 40.3% reportedly quit, 27.3% decreased the amount they smoked, 31.8% smoked at the same level, and fewer than 1% increased their smoking.

In 1998, 11.2% of women who gave birth had less than a high school education; 27.0% had a high school diploma or GED; 25.0% had some college education; and 36.8% had at least a college degree. Women with more education were more likely to receive adequate prenatal care; more likely to breastfeed; and more likely to have multiple births. They were less likely to smoke during pregnancy and less likely to receive publicly financed prenatal care.

Massachusetts perinatal health indicators were generally better than those for the U.S. as a whole in 1998. The IMR was 29% lower; the low birth weight (LBW) rate was 9% lower; the teen birth rate was 44% lower; and use of prenatal care in the first trimester was 2% higher than the U.S. rates.

Birth Rates

In 1998, 55.4 births occurred for every 1,000 Massachusetts women ages 15-44 years. This represents an 11% decrease since 1990. The Massachusetts birth rate was 16% below the U.S. rate of 65.6 births per 1,000 women ages 15-44 years.

There were 28.6 live births occurred for every 1,000 women ages 15-19 years, a 19% decrease since 1990. This rate was 44% below the national teen birth rate of 51.1 per 1,000 women ages 15-19.

The age-specific birth rates were highest for 30-34 years old and 25-29 years old mothers at 102.8 and 81.9 births per 1,000 women, respectively. The birth rates for women ages 30 years and over increased in 1998, as they have throughout the 1990s. The age groups with the largest increases in birth rates since 1990 were 45-49 years (62.5%) and 40-44 years (44.9%). Continuing the trend that was first observed in 1996, there were more births to women ages 30 years and over than under age 30 years.

Infant Mortality Rates (IMR)

In 1998, 414 infant deaths occurred among Massachusetts residents, 11 fewer than the number of infant deaths in 1997. The 1998 IMR was 5.1 deaths per 1,000 live births. This rate was 29% below the 1998 U.S. preliminary rate of 7.2 deaths per 1,000 live births.

Between 1980 and 1998, the infant mortality rate decreased by 50% for infants born to black and white women. Infants born to black non-Hispanic mothers continue to have the highest IMR, 10.6 per 1,000 live births. This represents a 9% decrease from the 1997 rate of 11.7, but more than double the IMR for white non-Hispanic mothers (4.6). The 1998 IMR for Hispanics was unchanged from 1997 (6.7 per 1,000 live births), 7% lower than the 1995 rate. Asian mothers had the lowest infant mortality rate, 2.7 per 1,000 live births, compared to the other race/ethnicity groups. (Caution should be used when interpreting this rate since it is based on only 10 deaths).

Among white non-Hispanic mothers, the neonatal mortality rate (deaths to infants less than 28 days old) decreased 5% from 1997 (3.5 per 1,000 live births in 1998 compared to 3.7 in 1997). During this same time period, the neonatal mortality rate increased by 6% among black non-Hispanic mothers (from 8.0 in 1997 to 8.5 in 1998) and decreased by 4% among Hispanic mothers (from 5.2 in 1997 to 5.0 in 1998). The overall post neonatal mortality rate, representing the number of deaths to infants between 28 and 364 days old, was 1.2 in 1998 and 1.3 in 1997. The post neonatal mortality rate among infants of white non-Hispanic mothers was the same in 1998 as in 1997, 1.1 deaths per 1,000 live births. During the same period, the rates decreased by 41% among infants of black non-Hispanic mothers (from 3.7 in 1997 to 2.2 in 1998), and increased slightly among infants of Hispanic mothers (from 1.5 in 1997 to 1.7 in 1998). The number of post neonatal deaths among Asians remained the same in 1998 as 1997 (3 deaths).

Among the 30 largest communities in Massachusetts, only one had an infant mortality rate in excess of 10 deaths per 1,000 live births in 1998, compared to 4 communities in 1997, 2 in 1996 and none in 1995. In 1998, the infant mortality rates were highest in Chicopee, 11.4 deaths per 1,000 live births (7 deaths) and Brockton, 9.6 (14 deaths). Because of the relatively

small number of infant deaths, year-to-year fluctuations in infant mortality rates for individual communities should be interpreted with caution: none of the 30 largest communities had an average infant mortality rate in excess of 10 deaths per 1,000 live births for the period of 1996 to 1998. Two Massachusetts communities had more than 20 infant deaths in 1998: Boston (46 infant deaths, an IMR of 5.8 compared to 8.4 in 1997) and Springfield (21 deaths, an IMR of 8.9 compared to 9.9 in 1997).

The leading causes of infant death were conditions arising in the perinatal period (234 deaths) and congenital anomalies (78 deaths). Other causes of infant death include sudden infant death syndrome (SIDS) (22 deaths), disease of the respiratory system (11 deaths), "other diseases of nervous system and sense organs" (6 deaths), and homicide (2 deaths). There were 8 fewer deaths from SIDS in 1998 than there were in 1997.

Low Birthweight and Prematurity

In 1998, 6.9% (5,655) of infants born to Massachusetts women were low birthweight (less than 2,500 grams or 5.5 pounds). This rate was approximately the same as in 1997 (7.0%) in Massachusetts, and was 9.2% below the national figure of 7.5%.

The proportion of low birthweight infants varied by mother's race and ethnicity. Black non-Hispanic women had the highest proportion of low birthweight infants (11.8%); Hispanic mothers delivered 7.8% low birthweight infants; Asian mothers, 7.5% low birthweight infants; white non-Hispanic mothers delivered 6.3% low birthweight infants. The Massachusetts low birthweight rate for black non-Hispanic women (11.8%) was lower than the 1998 U.S. preliminary rate for all black women (13.0%). The rate of low birthweight for Massachusetts Hispanic women (7.8%) was higher than the corresponding preliminary U.S. rate of 6.4%. This may be due to differences in the composition of the Hispanic population in Massachusetts and the nation as a whole. In Massachusetts, the Hispanic population is composed mainly of people who identify their ethnicity as Puerto Rican, Dominican, and Central American. The U.S. Hispanic population has a much greater percentage of people of Mexican and Cuban descent who have relatively low rates of low birthweight. The Massachusetts low birthweight rate for Puerto Ricans, 9.1% in 1998, was lower than the U.S. Puerto Rican low birthweight of 9.4% in 1997.

In 1998, 7.5% (6,117) of infants born to Massachusetts resident women were preterm (premature), born before the 37th week of pregnancy; and 91.8% of infants were born at normal gestational age - completion of the 37th and 42nd week of pregnancy.

Adequacy of Prenatal Care

In 1998, 79.8% of women received adequate prenatal care. Adequacy of prenatal care, like infant mortality, varied among racial and ethnic groups. White non-Hispanic women had the highest percentage of adequate prenatal care: 83.6%. The percentage of black non-Hispanic women receiving adequate prenatal care was 67.9%, and the percentage of Hispanic women was 66.9%. The percentage of all Asian women with adequate prenatal care was 72.2%. Cambodian women, however, had the lowest percentage of adequate prenatal care, 44.7%.

Adequacy of prenatal care also varied among the 30 largest Massachusetts communities. At least 85% of mothers in Arlington, Brookline, Framingham, Newton, Quincy, and Weymouth received adequate prenatal care. In contrast, fewer than 70% of mothers received adequate prenatal care in five communities: Lawrence, 58.2%; Lowell, 59.9%; Springfield, 64.7%; Worcester, 67.5%; and Brockton, 66.6%.

Women whose prenatal care was publicly financed were less likely to receive adequate prenatal care in all race-ethnicity groups. For example, only 59.3% of black non-Hispanic women whose prenatal care was publicly financed received adequate prenatal care, while 80.3% of black non-Hispanic women with private insurance received adequate prenatal care.

Another measure of access to prenatal care is the percentage of women who receive prenatal care in the first trimester of their pregnancy. A higher percentage of Massachusetts women received prenatal care in the first trimester compared to the U.S. as a whole: 84.3% in Massachusetts versus 82.8% nationwide.

Cesarean Sections

In 1998, Cesarean section was the method of delivery for 21.0% of the births in Massachusetts maternity care facilities regardless of the mother's state of residence (20.9% for Massachusetts resident mothers), down from 22.5% of the 1990 births. (Calculations are based on births with known method of delivery.) Facilities with low rates of Cesarean section deliveries were: Nantucket Cottage Hospital (11.0%, 8 Cesarean section deliveries performed); Tobey Hospital (13.2%, 53 Cesarean section deliveries performed); Martha's Vineyard Hospital (14.4%, 16 Cesarean section deliveries performed); and Heywood Memorial Hospital (14.6%, 75 Cesarean section deliveries performed). Seven hospitals had Cesarean section delivery rates of 25% or more (Beth Israel Deaconess Medical Center, Boston Regional Medical Center, Fairview Hospital, Morton Hospital, North Adams Regional Hospital, Quincy Hospital and St. Elizabeth's Medical Center of Boston). And, for the fifth consecutive year, there were no hospitals that reported Cesarean section as the method of delivery for 30% or more of its births.

In 1998, 32.7% (2,823) of women with a previous Cesarean section, had a vaginal birth after Cesarean delivery (VBAC). The rate of VBACs has increased since 1989 (21.0%).

CHAPTER 1

BIRTH CHARACTERISTICS

Birth Rates and Numbers

In 1998, 81,406 live births occurred to Massachusetts residents (Table 1). This number represents a 12% increase since 1980 but a decrease of 12% since 1990. The birth rate in 1998 was 55.4 births per 1,000 women ages 15-44 years. This was 16% below the U.S. birth rate of 65.6 births per 1,000 women of the same ages (National Vital Statistics Report, Vol. 47, No. 25, October 5, 1999, p. 3). In Massachusetts, the birth rate increased by 4% since 1980. However, beginning in 1990, the birth rate declined steadily until 1996. (It increased slightly -- 1.5% -- between 1996 and 1998.) For the third year in a row, there were more births to women ages 30 years and above than to women under age 30 (Figure 1).

Distribution of Births by Race and Hispanic Ethnicity

From 1980 to 1998, the number of Massachusetts live births to white women increased by 6%; to black women 37%; and to women of Asian and other races by 297% (Table 1). In 1998 in Massachusetts, 75.9% of births (61,765) were to white non-Hispanic mothers; 10.6% of births (8,665) were to Hispanic mothers; 6.8% of births (5,549) were to black non-Hispanic mothers; and 4.6% of births (3,748) were to Asian mothers (Table 2A).

In 1998, 18.3% of births in Massachusetts were to foreign-born mothers. The percentage of foreign-born mothers varied by race: 92.6% of Asian births were to foreign-born women; 40.3% of Hispanic births were to foreign-born women; 39.2% of black non-Hispanic births were to foreign-born women; and 7.8% of white non-Hispanic births were to foreign-born women.

Teen Birth Rates

For every 1,000 female residents of Massachusetts ages 15-19 there were nearly 29 live births, a 19% decrease from the 1990 rate of 35.4 (Table 1). From 1990 to 1997, the Massachusetts female population ages 15-19 years decreased by 2%. From 1990 to 1998, the actual number of births to females ages 15-19 years decreased by 20%.

Less than 3% of all infants were born to women under 18 years of age, and 7.3% were born to women under 20 years of age. The percentage of births to teenagers varied by race and ethnicity, partially reflecting differences in the percentage of teenage women within each race/ethnic group. Among mothers who designated their ethnicity as Puerto Rican, 12.7% of births were to women under 18 years of age, and 28.3% to women under 20 years of age. The percent of teen births was lowest among women of Chinese ethnicity, 0.5% (Table 2B).

Low Birthweight

In 1998, 6.9% (5,655) of infants born to Massachusetts women were low birthweight (less than 2,500 grams or 5.5 pounds). This rate is slightly lower than the 1997 figure of 7.0% (Table 1). The low birthweight rate in Massachusetts was 9% below the national figure of 7.6%.

Prenatal Care

In 1998, almost 80% of women received adequate prenatal care (Table 1). (Refer to the Glossary in the Appendix for a definition of adequate prenatal care.) The percentage of women who received adequate prenatal care varied by race and ethnicity. The groups with high rates of adequate prenatal care were: white non-Hispanics (83.6%) and women who designated their ethnicity as European (84.4%) and Chinese (80.6%). In contrast, groups with low rates of adequate prenatal care were women who designated their ethnicity as: Cambodian (44.7%); Salvadoran (55.5%); Haitian (63.1%); Cape Verdean (64.5%); and Puerto Rican (65.0%). The percentage of foreign-born mothers receiving adequate prenatal care was less than U.S.-born mothers: 72.2% vs. 81.5% (Tables 2A & 2B).

Statewide, 84.3% of women received prenatal care during the first three months of pregnancy. The highest percentage of first trimester registration occurred among U.S.-born white non-Hispanic women, 88.3%. Cambodian women had the lowest percentage, 52.7%.

Cesarean Section Deliveries

In 1998, 20.9% of Massachusetts resident infants were delivered by Cesarean section (Table 2A). This represents a 7% decline from the 1990 rate of 22.4% (data not shown), but a slight increase from 19.8% in 1997. Black non-Hispanic women had the highest percentage of Cesarean section deliveries, at 22.6% (Table 2A). In more detailed analyses of Cesarean section by maternal ancestry, the highest percentage of Cesarean section deliveries occurred among Brazilian women (28.6%). Cambodian women delivered the lowest percentage of infants by Cesarean section, 11.4% (Table 2B).

Breastfeeding

Nearly 71% of Massachusetts mothers reported that they were breastfeeding or planning to breastfeed their infants (Table 2A). This represents a 25% increase since 1990 (56.6%, data not shown). Asian Indian, Brazilian, African, Middle Easterner, Salvadoran, West Indian and Caribbean, and Other Asian/Pacific Islander (primarily women who designated their ethnicity as Korean, Filipino, and Japanese) mothers all reported breastfeeding proportions of over 85%. Mothers of Cambodian and Vietnamese descent reported the lowest proportion of breastfeeding, 45.3% and 49.3%, respectively (Table 2B).

The percentage of mothers reporting breastfeeding or planning to breastfeed their infants increased as the mother's age increased. Mothers 45 years or older reported the highest percentage, 85.6%, while mothers in the youngest age group, ages 10-14, reported the lowest (40.3%, Figure 2).

Birth Characteristics in the 30 Largest Massachusetts Cities and Towns

In 1998, among the largest 30 communities in the Commonwealth, the crude birth rates (number of births per 1,000 population) were highest in Lawrence (20.1) and Holyoke (17.1). Crude birth rates were lowest in Newton (9.5), and Cambridge (10.7) (Table 3A). Plymouth had the highest percentage of births to white non-Hispanic mothers, 95.6%. Communities with the highest percentage of births to black non-Hispanic women were: Boston, 31.6%; Brockton, 23.6%; Springfield, 22.6%; and Cambridge, 16.5%. In six of the 30 largest municipalities, 20% or more of 1998 births were to Hispanic women: Lawrence, 69.5%; Holyoke, 61.6%; Springfield, 38.6%; Lynn, 27.8%; Worcester, 24.9%; and Boston, 22.3%.

Six communities (Boston, Brockton, Fall River, Lowell, Revere, Springfield) recorded low birthweight percentages that were 25% higher than the statewide average of 7.0%. Adequacy of prenatal care varied by community, with 85% or more of the mothers in Arlington, Brookline, Framingham, Newton, Quincy, and Weymouth receiving adequate prenatal care. In contrast, fewer than 70% of mothers received adequate prenatal care in five communities: Lawrence, 58.2%; Lowell, 59.9%; Springfield, 64.7%; Worcester, 67.5%; and Brockton, 66.6%. The birth rate for teens was highest in Holyoke (131.3 births per 1,000 females ages 15 to 19 years), more than four and a half times the statewide rate of 28.6 and more than 15% higher than Lawrence (113.4/1,000) or Springfield (84.1/1,000), the two communities with the next highest teen birth rates (Table 3A).

In 1998, of the 30 largest communities, Chicopee is the only one that had an infant mortality rate in excess of 10 deaths per 1,000 live births: 11.4. Infant mortality rates should be interpreted with caution in individual communities with a small number of infant deaths - none of the 30 largest communities has an average infant mortality rate in excess of 10 deaths per 1,000 live births for the period of 1996 to 1998 (Table 3A).

Birth Characteristics in Community Health Network Areas

Among the 27 Massachusetts Community Health Network Areas (CHNAs), four had crude birth rates of 15 births or more per 1,000 population: Greater Lawrence Community Health Network (15.9); Community Partners for Health (Milford) (15.8); Greater Lowell Community Health Network (15.1); and Community Health Network of Greater Metro West (Framingham) (15.0) (Table 3B). In three CHNAs (Alliance for Community Health - Boston/Chelsea/Revere/Winthrop, Greater Brockton Community Health Network, and Partners for a Healthier Community – Fall River), 8.6% of the resident births were low birthweight -- this is more than 20% higher than the statewide average of 7.0%. In five of the CHNAs, fewer than 75% of mothers received adequate prenatal care: Greater Lawrence Community Health Network (68.2%); Community Wellness Coalition (Worcester) (71.2%); The Community Health Connection (Springfield) (71.5%); Greater Lowell Community Health Network(71.8%); and Four (For) Communities (Holyoke) (72.8%) (see Glossary in the Appendix for a description of the CHNAs).

The teen birth rates for the CHNAs of Greater Lawrence Community Health Network, The Community Health Connection (Springfield), and Four (For) Communities (Holyoke) were the highest in the state. Community Wellness Coalition (Worcester) had the highest infant mortality rates in 1998: 8.6 deaths per 1,000 live births. Because of the relatively small number of infant deaths, mortality rates in individual CHNAs should be interpreted with caution – none of the

CHNAs had 3-year average (1996-1998) infant mortality that is 25% higher than the state average (Tables 3B).

Tobacco Use

In 1998, 11.6% of births were to mothers who reported smoking cigarettes during their pregnancy. This is a 40% decline from 19.3% in 1990 (data not shown). There is substantial variation in smoking by race/ethnicity: white non-Hispanic and black non-Hispanic mothers report the highest rates, 12.7% and 9.8% respectively. Asian mothers have the lowest smoking rate (1.4%) (Figure 3).

The majority (80.8%) of women who gave birth in 1998 were non-smokers prior to pregnancy, and 99.9% of them continued to abstain from smoking during pregnancy. (Eighty-four women started smoking during pregnancy.) A substantial number (6,270) of women quit smoking during pregnancy, with the greatest percentage of quitting (56.9%) occurring among women who were "light" smokers (1-10 cigarettes daily) prior to pregnancy; followed by 29.0% of women who were "moderate" smokers (11-20 cigarettes daily) prior to pregnancy; and 13.9% of "heavy" smokers (21 or more cigarettes daily). Among moderate and heavy smokers, 76.4% either quit or reduced their daily number of cigarettes during pregnancy (Figure 4).

Patterns in Number and Rate of Births by Age Group

There has been a marked change in the age distribution of Massachusetts resident mothers since 1980. Approximately 25% of women giving birth were ages 30 years and older in 1980 as compared to 52.5% in 1998. In 1998, there were more births to women ages 30 years and older (42,749) than to women under age 30 (38,657) (Figure 1).

The age-specific birth rate for Massachusetts resident women ages 15-44 years decreased 11% from 1990 (62.1 per 1,000 women) to 1998 (55.4 per 1,000 women). In 1998, the age-specific birth rates were highest for 30-34 year old (102.8 per 1,000) and 25-29 year old mothers (81.9 per 1,000) (Table 4). The birth rates for women ages 30 years and older have increased steadily throughout 1990s (data not shown).

The age groups with the largest increases in birth rates from 1990 were women ages 45-49 years (62.5% increase), and women ages 40-44 years (44.9% increase). In 1995, the birth rate for Massachusetts resident women ages 30-44 years surpassed the rate for women younger than age 30 years for the first time in Massachusetts history (data not shown).

The Massachusetts birth rate for teenage women (ages 15-19) was 44% below the national rate of 55.1 (National Vital Statistics Report, Vol. 47, No. 25, October 5, 1999, p. 3). In 1998, the Massachusetts birth rate to women ages 15-19 years was 28.6 births per 1,000 whereas the U.S. rate was 51.1 per 1,000 women age 15-19 years. In 1998, there were 79 births to mothers ages 12-14 years and there were 119 births to women 45 years of age or older (Table 4). *(Please note: Massachusetts birth rates for women ages 15-19 years in this publication use 1997 population estimates updated by the Massachusetts Institute for Social and Economic Research (MISER) in November, 1999. These rates may differ from teen birth rates given in previous publications which use estimates based on previous population estimates. They may*

also differ from rates given in federal publications which use U.S. Census population estimates).

Parity

Parity is defined as the total number of live infants ever born to a woman, including the current birth. In 1998, 43.4% of all Massachusetts women who gave birth did so for the first time. One-third (34.0%) had a second child. About 17% of births to teenage women ages 15 to 19 years were a second or higher birth (Table 5).

Women ages 30-44 years were more likely to be giving birth to a second child -- 38.4% of women ages 30 to 34 year olds, 36.9% of 35 to 39 year olds, and 31.7% of women ages 40 to 44 years gave birth to a second child. Women ages 45 years and older were more likely to be giving birth for the first time (39.5%).

Plurality

Plurality represents the number of births to a woman produced in the same gestational period. In 1998, 95.8% of all births were singletons, 3.8% were twins and 0.4% were triplets or higher order multiples (Table 6). The total percentage of multiple births (twins, triplets or more) was 4.2% in 1998. This compares to 2.5% in 1989, a 68% increase. The increase since 1989 in the percentage of multiple births varies by age. For women under age 35, the percentage of multiple births increased from 2.3% in 1989 to 3.6% in 1998, an increase of 57%. Among women ages 35 and older, the percentage of multiple births nearly doubled during this time period. In 1998, it was 6.4% -- up from 3.4% in 1989 -- representing an increase of 88%.

Education

In 1998, 11.2% of women who gave birth had less than a high school education; 27.0% had a high school diploma or GED; 25.0% had some college education; and 36.8% had at least a college degree. Maternal educational attainment varied by race: 47.0% of Asian women had at least a college degree, while 14.7% of non-Hispanic black women and 8.6% of Hispanic women had at least a college degree. Women with more education were more likely to receive adequate prenatal care; more likely to breastfeed; more likely to have multiple births. They were less likely to smoke during pregnancy and less likely to receive publicly financed prenatal care (Table 7).

Table 1. Trends in Birth Characteristics, Massachusetts: 1980, 1985, 1990-1998

Characteristic		1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Births[1]	#[2]	72,591	81,781	92,461	88,176	87,202	84,627	83,758	81,562	80,164	80,321	81,406
	Rate[3]	53.4	57.5	62.1	59.4	59.1	57.6	57.0	55.5	54.6	54.7	55.4
Race of Mother												
White[4]	#	66,220	71,854	80,775	76,983	76,052	73,704	72,980	71,083	69,485	69,503	70,452
	%	91.2	87.9	87.4	87.3	87.2	87.1	87.1	87.2	86.7	86.5	86.5
Black	#	4,626	5,099	7,729	7,352	7,203	6,916	6,713	6,299	5,946	6,182	6,337
	%	6.4	6.2	8.3	8.3	8.3	8.2	8.0	7.7	7.4	7.7	7.8
Asian/Other[5]	#	1,069	1,741	3,688	3,566	3,582	3,664	3,790	3,817	3,950	4,217	4,248
	%	1.5	2.1	4.0	4.0	4.1	4.3	4.5	4.7	4.9	5.3	5.2
Unknown	#	676	3,087	269	275	365	343	275	363	783	419	369
	%	0.9	3.8	0.3	0.3	0.4	0.4	0.3	0.4	1.0	0.5	0.5
Teen Births	#	7,694	6,859	7,258	6,892	6,555	6,469	6,412	5,990	5,758	5,801	5,823
(Ages 15-19)	**Rate**[3]	28.1	28.7	35.4	35.4	34.5	34.0	33.2	30.3	28.5	28.5	28.6
Births to												
Unmarried	#	11,356	15,044	22,837	22,852	22,612	22,345	22,302	20,857	20,253	20,640	21,191
Mothers	**%**	15.6	18.4	24.7	25.9	25.9	26.4	26.6	25.6	25.3	25.7	26.0
Low	#	4,413	4,751	5,388	5,199	5,137	5,202	5,335	5,174	5,105	5,617	5,655
Birthweight	**%**	6.1	5.8	5.8	5.9	5.9	6.1	6.4	6.3	6.4	7.0	6.9
Adequate	**%**	82.0	79.4	80.1	81.6	82.9	83.8	84.3	84.2	79.9	80.0	79.8
Prenatal Care[6]	**%**	79.6	78.6	78.8	81.2	82.7	83.6	84.1	83.6	75.7	79.0	79.4

[1] Births presented in all tables are resident live births unless otherwise specified. [2] Differences in numbers of births from previous publications are the result of updated files. [3] Birth rates represent the total number of births to women age 15-44 years per 1,000 females ages 15-44; teen birth rates refer to number of births per 1,000 women age 15-19. Birth rates and teen birth rates for 1991-1997 have been updated using MISER population estimates for 1991-1995 (released in September 1999) and 1996-1997 (released in November 1999). 1998 birth rates are calculated using the 1997 MISER population estimates. PLEASE NOTE: DIFFERENCES BETWEEN THESE RATES AND PREVIOUSLY PUBLISHED DATA REFLECT UPDATES IN POPULATION ESTIMATES. [4] On tables and graphs, which include data prior to June 1986, the race classifications do not include an ethnicity component; most Hispanics are included in the race category of white. [5] Other races include American Indian and others not specified. [6] Percentages in upper row are based on births with known scores of adequacy of prenatal care; bottom row percentages are based on total numbers of births. In subsequent tables and figures, percentage with adequate prenatal care is computed only on births with known adequacy scores. Adequacy of prenatal care has been recalculated for 1996, 1997, and 1998, which reflects computational adjustments to make Massachusetts data more comparable to the calculations recommended by the National Center for Health Statistics. See Technical Foreword for details.

NOTE: See Technical Foreword for changes in birth data collection.

Table 2A. Birth Characteristics by Maternal Race/Hispanic Ethnicity, Massachusetts: 1998

Race and Hispanic Ethnicity	Births[1]		Teen Births				Birthweight				Prenatal Care				Cesarean Section		Breast Feading[4]	
			<18 Years		<20 Years		Very Low[2]		Low[3]		Adequate		First Trimester					
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
State Total	81,406	100.0	2,133	2.6	5,902	7.3	1,070	1.3	5,655	6.9	64,616	79.8	68,300	84.3	16,975	20.9	56,591	70.9
US-Born	66,529	81.7	1,852	2.8	5,121	7.7	871	1.3	4,625	7.0	53,933	81.5	56,973	86.1	14,026	21.2	44,592	68.6
Foreign-Born[6]	14,877	18.3	281	1.9	781	5.2	199	1.3	1,030	6.9	10,683	72.2	11,327	76.5	2,949	19.9	11,999	81.5
White Non-Hispanic	61,765	75.9	862	1.4	2,953	4.8	689	1.1	3,918	6.3	51,384	83.6	54,095	87.9	13,221	21.5	42,649	70.7
US-Born	56,958	92.2	836	1.5	2,846	5.0	655	1.1	3,628	6.4	47,531	83.9	50,075	88.3	12,275	21.6	38,766	69.7
Foreign-Born	4,807	7.8	26	0.5	107	2.2	34	0.7	290	6.0	3,853	80.6	4,020	84.0	946	19.7	3,883	82.3
Black non-Hispanic	5,549	6.8	301	5.4	745	13.4	154	2.8	657	11.8	3,749	67.9	4,014	72.7	1,250	22.6	3,798	68.9
US-Born	3,376	60.8	262	7.8	639	18.9	91	2.7	444	13.2	2,283	68.0	2,456	73.0	698	20.7	1,978	59.2
Foreign-Born	2173	39.2	39	1.8	106	4.9	63	2.9	213	9.8	1466	67.9	1558	72.1	552	25.4	1820	84.0
Hispanic	8,665	10.6	765	8.8	1,775	20.5	160	1.8	674	7.8	5,773	66.9	6,197	71.7	1,558	18.0	6,241	72.2
US-Born	5,169	59.7	649	12.6	1,431	27.7	107	2.1	464	9.0	3,449	67.0	3,725	72.3	881	17.1	3,224	62.5
Foreign-Born	3496	40.3	116	3.3	344	9.8	53	1.5	210	6.0	2324	66.8	2472	70.9	677	19.4	3017	86.4
Asian	3,748	4.6	96	2.6	185	4.9	38	1.0	280	7.5	2,697	72.2	2,886	77.2	617	16.5	2,802	75.2
US-Born	279	7.4	27	9.7	36	12.9	6	2.2	25	9.0	214	77.0	225	80.9	40	14.3	226	81.6
Foreign-Born	3469	92.6	69	2.0	149	4.3	32	0.9	255	7.4	2483	71.8	2661	76.9	577	16.7	2576	74.7
Other[7]	1,530	1.9	107	7.0	239	15.6	26	1.7	121	7.9	969	63.7	1,062	69.7	311	20.4	1,063	70.1
US-Born	628	41.0	77	12.3	165	26.3	9	1.4	59	9.4	421	67.4	456	73.0	118	19.0	369	59.3
Foreign-Born	902	59.0	30	3.3	74	8.2	17	1.9	62	6.9	548	61.2	606	67.5	193	21.4	694	77.6
Unknown[8]	149	0.2	2	--[5]	5	3.4	3	--[5]	5	3.4	44	62.0	46	64.8	18	20.9	38	67.9

[1] In the first category, "Births", percentages are based on column totals, percentages of US-Born and Foreign-Born are based on subtotals of each race/Hispanic ethnicity category. For all other categories, percentages are based on row totals. For Prenatal Care, Cesarean Section, and Breastfeeding variables, percentages are calculated only for cases where information is known. [2] Very low birthweight: less than 1,500 grams or 3.3 pounds. [3] Low birthweight: less than 2,500 grams or 5.5 pounds. [4] Mother was breastfeeding or was intending to breastfeed at the time the birth certificate was completed. [5] Calculations based on fewer than five events are excluded. [6] "US Born" includes women born in Puerto Rico, the US Virgin Islands, and Guam. [7] Other: Mothers who designated themselves as Other race. [8] Unknown: Mothers who did not indicate a race/ethnicity.

NOTE: See Technical Foreword for changes in birth data collection.

Table 2B. Birth Characteristics by Major Maternal Ancestries, Massachusetts: 1998

Ancestry	Births[1]		Teen Births				Birthweight				Prenatal Care				Cesarean Section		Breast Feading[4]	
			<18 Years		<20 Years		Very Low[2]		Low[3]		Adequate		1st Trimester					
	#	%[5]	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
State Total	81,406	100.0	2,133	2.6	5,902	7.3	1,070	1.3	5,655	6.9	64,616	79.8	68,300	84.3	16,975	20.9	56,591	70.9
Puerto Rican	4,463	5.5	568	12.7	1,265	28.3	96	2.2	406	9.1	2,889	65.0	3,132	70.4	768	17.2	2,705	60.7
Dominican	1,493	1.8	85	5.7	218	14.6	26	1.7	93	6.2	1,012	67.9	1,086	72.8	292	19.6	1,255	84.2
Salvadoran	599	0.7	18	3.0	63	10.5	12	2.0	44	7.3	330	55.5	354	59.4	92	15.5	519	86.8
Other Central American	663	0.8	29	4.4	69	10.4	4	--[5]	36	5.4	451	68.4	475	71.9	124	18.7	556	83.9
Other Hispanic[6]	1,447	1.8	65	4.5	160	11.1	22	1.5	95	6.6	1,091	75.7	1,150	79.7	282	19.5	1,206	83.6
Chinese	1,071	1.3	2	--[5]	5	0.5	10	0.9	61	5.7	861	80.6	900	84.3	197	18.4	874	81.8
Vietnamese	587	0.7	13	2.2	27	4.6	6	1.0	40	6.8	409	69.9	427	72.9	82	14.0	289	49.3
Cambodian	510	0.6	60	11.8	97	19.0	6	1.2	58	11.4	228	44.7	269	52.7	58	11.4	231	45.3
Asian Indian	612	0.8	0	0.0	2	--[5]	5	0.8	58	9.5	457	75.2	508	83.4	122	20.1	575	94.9
Other Asian/PI[7]	1,068	1.3	20	1.9	58	5.4	11	1.0	68	6.4	792	74.2	837	78.4	184	17.3	908	85.3
Cape Verdean	792	1.0	60	7.6	133	16.8	8	1.0	54	6.8	508	64.5	553	70.1	138	17.6	513	64.9
Brazilian	683	0.8	18	2.6	52	7.6	8	1.2	44	6.4	508	74.6	530	77.7	195	28.6	640	93.7
Other Portuguese	1,378	1.7	31	2.2	131	9.5	10	0.7	96	7.0	1,093	79.8	1,145	83.6	294	21.5	644	46.9
Haitian	950	1.2	17	1.8	45	4.7	33	3.5	91	9.6	596	63.1	644	68.2	254	26.8	765	80.5
W. Indian /Carib.[8]	586	0.7	14	2.4	44	7.5	13	2.2	55	9.4	409	70.3	440	75.6	121	20.7	503	85.8
African-American	2,814	3.5	226	8.0	543	19.3	76	2.7	351	12.5	1,930	69.0	2,080	74.2	578	20.6	1,643	58.5
African[9]	666	0.8	4	--[5]	15	2.3	16	2.4	58	8.7	467	70.2	486	73.1	173	26.1	591	88.7
Middle Easterner[10]	799	1.0	9	1.1	24	3.0	2	--[5]	40	5.0	603	75.7	651	81.7	145	18.1	701	88.0
Native American	280	0.3	17	6.1	46	16.4	1	--[5]	16	5.7	194	69.5	203	72.8	57	20.5	184	65.7
European	14,841	18.2	82	0.6	334	2.3	138	0.9	871	5.9	12,477	84.4	13,061	88.3	3,174	21.4	11,941	81.2

[1] In the first category, "Births", percentages are based on column totals. For all other categories, percentages are based on row totals. For Prenatal Care, Cesarean Section, and Breastfeeding variables, percentages are calculated only for cases where information is known. [2] Very low birthweight: less than 1,500 grams or 3.3 pounds. [3] Low birthweight: less than 2,500 grams or 5.5 pounds. [4] Mother was breastfeeding or was intending to breastfeed at the time the birth certificate was completed. [5] Calculations based on fewer than five events are excluded. [6] Other Hispanic includes Mexican, Cuban, Colombian, and Other South American. [7] Other Asian and Pacific Islander includes Korean, Filipino, Japanese, Laotian, Thai, Pakistani and Hawaiian. [8] West Indian and Caribbean include Jamaican and Barbadian. [9] African includes Nigerian and other African. [10] Middle Easterner includes Lebanese, Iranian, and Israeli.

NOTE: See Technical Foreword for changes in birth data collection.

Table 3A. Resident Birth Characteristics, 30 Largest Municipalities[1], Massachusetts: 1998

Municipality	Rank	Population	Crude Birth Rate[2]	Mother's Race and Ethnicity				Very Low Birthweight[4] (<1500 gms).	Low Birthweight[4] (<2500 gms).
				White Non-Hispanic %	Black Non-Hispanic %	Hispanic %	Asian or Other[3] %	%	%
STATE TOTAL		6,227,622	13.1	75.9	6.8	10.6	6.5	1.3	7.0
ARLINGTON	27	42,809	12.4	89.3	1.7	2.6	6.0	1.7	7.6
BARNSTABLE	26	45,748	11.2	87.7	2.9	3.5	5.7	--[5]	6.7
BOSTON	1	559,379	14.1	35.1	31.6	22.3	10.7	1.6	8.8
BROCKTON	8	89,121	16.3	49.7	23.6	9.9	16.7	2.4	10.1
BROOKLINE	15	58,906	11.1	75.0	2.9	2.7	19.1	--[5]	6.7
CAMBRIDGE	5	96,423	10.7	56.6	16.5	9.6	17.2	1.1	7.4
CHICOPEE	19	54,378	11.3	79.2	2.0	16.7	2.1	1.6	7.0
FALL RIVER	9	88,313	12.5	89.6	4.3	3.1	2.9	2.6	9.2
FRAMINGHAM	14	65,733	15.0	71.1	5.9	13.6	8.9	2.0	8.4
HAVERHILL	18	55,506	15.2	86.4	1.9	9.2	2.4	0.8	5.9
HOLYOKE	30	41,194	17.1	34.4	2.5	61.6	1.4	1.7	7.2
LAWRENCE	13	69,802	20.1	25.5	2.5	69.5	2.6	2.1	6.8
LOWELL	4	104,418	16.1	53.1	3.4	17.7	25.6	1.7	9.2
LYNN	11	83,295	16.4	48.4	13.2	27.8	10.5	1.8	8.0
MALDEN	22	52,701	14.5	62.2	12.0	4.6	20.8	1.4	8.2
MEDFORD	17	57,295	10.6	81.9	10.5	1.6	5.8	1.8	7.6
METHUEN	29	41,467	13.7	77.3	--[5]	15.5	6.5	1.6	6.3
NEW BEDFORD	6	95,057	13.8	72.7	4.9	13.9	8.3	1.1	6.9
NEWTON	7	90,464	9.5	82.1	2.3	4.1	11.4	--[5]	4.9
PEABODY	24	49,995	11.3	87.9	1.1	5.9	5.0	1.2	5.3
PITTSFIELD	25	47,050	10.8	92.0	2.9	2.2	2.9	1.4	6.3
PLYMOUTH	23	50,196	13.2	95.6	1.5	0.9	2.0	--[5]	4.7
QUINCY	10	86,256	12.9	75.1	4.8	2.6	17.6	1.1	5.3
REVERE	28	41,905	15.0	65.8	5.9	15.4	12.7	1.4	9.1
SOMERVILLE	12	77,302	12.2	60.4	10.0	17.2	12.4	1.3	6.7
SPRINGFIELD	3	148,178	16.0	35.3	22.6	38.6	3.5	2.0	9.9
TAUNTON	21	53,046	15.5	85.3	4.1	6.2	4.1	1.6	8.3
WALTHAM	16	58,011	12.2	62.9	6.9	18.4	11.5	2.4	7.5
WEYMOUTH	20	53,222	13.1	91.1	4.2	1.9	2.7	0.9	7.2
WORCESTER	2	167,507	14.4	56.8	9.1	24.9	9.1	1.7	7.8

Table 3A.(cont'd) Resident Birth Characteristics, 30 Largest Municipalities[1], Massachusetts: 1998

Municipality	Births					Deaths			
	Adequate Prenatal Care[4]	Public Payment for Prenatal Care	Unmarried[4]	Teen Mothers 15 to 19 years		Infant Mortality Rate[6]		Neonatal Mortality Rate[6]	
	%	%	%	#	Rate[2]	1998	1996-1998	1998	1996-1998
STATE TOTAL	79.8	24.7	26.0	5,823	28.6	5.1	5.1	3.9	3.8
ARLINGTON	87.3	6.4	7.3	9	10.7	--[5]	5.9	--[5]	5.3
BARNSTABLE	81.1	27.4	26.7	31	25.1	--[5]	6.7	--[5]	3.3
BOSTON	76.4	47.3	44.8	823	44.8	5.8	7.2	4.3	5
BROCKTON	66.6	48.1	50.2	178	65.7	9.6	7.5	8.9	5.8
BROOKLINE	88.5	5.3	6.6	12	9.1	0.0	--[5]	0	--[5]
CAMBRIDGE	81.5	15.4	18.0	31	10.3	--[5]	2.7	--[5]	1.7
CHICOPEE	72.0	42.2	43.0	70	39.5	11.4	8.5	9.8	6.2
FALL RIVER	78.7	43.8	43.7	155	56.4	7.2	6.6	7.2	5.4
FRAMINGHAM	86.4	20.6	18.5	44	22.9	--[5]	2.4	--[5]	2.4
HAVERHILL	78.2	25.6	30.2	80	50.8	5.9	6.1	--[5]	4.6
HOLYOKE	70.3	66.9	62.0	189	131.3	--[5]	7.0	--[5]	6.1
LAWRENCE	58.2	64.1	60.6	298	113.4	7.8	9.3	5	6.8
LOWELL	59.9	48.3	48.9	239	65.8	4.7	5.4	3	3.6
LYNN	71.4	51.7	48.5	191	76.2	6.6	9.2	4.4	6.7
MALDEN	79.1	25.7	21.5	26	22.7	9.2	6.5	6.5	5.2
MEDFORD	82.1	17.0	18.6	19	10.9	--[5]	2.6	--[5]	2.6
METHUEN	75.2	22.5	25.2	47	36.4	--[5]	4.1	--[5]	2.9
NEW BEDFORD	73.4	52.1	49.7	220	72.5	6.1	5.3	--[5]	2.4
NEWTON	90.1	4.1	6.1	7	1.8	--[5]	5.1	0	3.9
PEABODY	84.2	14.2	16.8	19	13.6	--[5]	8.8	--[5]	7.1
PITTSFIELD	74.7	41.8	42.4	68	47.7	--[5]	5.5	--[5]	3.7
PLYMOUTH	79.7	19.5	20.8	38	21.7	--[5]	5.1	--[5]	4
QUINCY	87.1	21.1	19.8	46	23.1	--[5]	4.4	--[5]	3.1
REVERE	72.5	38.2	34.1	46	39.9	--[5]	2.8	--[5]	--[5]
SOMERVILLE	76.2	31.3	28.9	60	36.7	--[5]	3.2	--[5]	2.1
SPRINGFIELD	64.7	60.9	60.8	458	84.1	8.9	9.0	6.3	7.2
TAUNTON	80.8	31.5	32.5	70	45.5	7.3	5.5	6.1	3.8
WALTHAM	81.5	20.0	22.3	26	12.4	--[5]	5.2	--[5]	4.7
WEYMOUTH	91.9	13.2	19.4	27	19.7	--[5]	4.1	--[5]	3.6
WORCESTER	67.5	43.4	44.3	328	51.2	7.0	8.3	6.2	6.7

[1]The 30 largest municipalities are the cities and towns in Massachusetts with the largest populations according to MISER 1997 population estimates (released in November 1999). [2] Crude birth rates represent the number of births per 1,000 residents; teen birth rates refer to number of births per 1,000 females ages 15-19. 1998 birth rates are calculated using the 1997 MISER population estimates (released in November 1999). [3] Mothers who designated themselves as Asian, American Indian or Other. [4] Percentages are calculated only for cases where information is known. [5]Calculations based on fewer than 5 events are excluded. [6] Deaths per 1,000 live births.

NOTE: See Technical Foreword for changes in birth data collection.

Table 3B: Resident Birth Characteristics, Community Health Network Areas (CHNAs), Massachusetts: 1998

CHNA	Population	Crude Birth Rate[1]	Mother's Race and Ethnicity: White non-Hispanic %	Black non-Hispanic %	Hispanic %	Asian or Other[2] %	Very Low Birthweight[3] (<1500 gms) %	Low Birthweight[3] (<2500 gms) %
STATE TOTAL	6,227,622	13.1	75.9	6.8	10.6	6.5	1.3	7.0
Community Health Network of Berkshire	139,534	9.3	93.6	1.5	1.9	2.2	1.6	6.3
Upper Valley Health Web (Franklin County)	86,725	10.4	94.0	0.8	2.4	2.6	1.6	6.8
Partnership for Health in Hampshire County (Northampton)	156,320	8.4	88.2	1.9	4.8	4.6	1.2	6.2
The Community Health Connection (Springfield)	289,271	13.6	58.5	14.0	24.6	2.8	1.6	8.3
Greater Southbridge Community Health Network	113,140	12.9	91.1	0.3	6.4	1.9	2.1	8.3
Community Partners for Health (Milford)	147,599	15.8	95.5	0.6	2.1	1.8	0.6	6.2
Community Health Network of Greater Metro West (Framingham)	362,270	15.0	88.2	1.7	4.7	5.1	1.0	6.0
Community Wellness Coalition (Worcester)	279,818	13.7	69.6	6.1	16.3	7.7	1.7	7.2
Fitchburg/Gardner Community Health Network	256,816	13.0	85.2	2.0	8.7	3.7	1.2	6.8
Greater Lowell Community Health Network	268,276	15.1	77.1	1.7	8.3	12.7	1.4	7.6
Greater Lawrence Community Health Network	174,449	15.9	54.4	1.7	39.2	4.8	1.5	6.1
Greater Haverhill Community Health Network	138,389	14.3	92.7	1.0	4.6	1.5	1.0	5.8
Greater Beverly/Gloucester Community Health Network	117,320	11.1	94.2	0.4	1.6	3.8	1.1	4.7
North Shore Community Health Network	274,579	12.9	73.8	5.8	14.5	6.0	1.5	7.2
Greater Woburn/Concord/Littleton Community Health Network	210,556	12.4	87.9	1.5	1.8	8.8	0.8	5.4
North Suburban Health Alliance (Medford/Malden/Melrose)	254,911	13.2	81.5	6.3	3.6	8.4	1.4	7.2
Greater Cambridge/Somerville Community Health Network	274,008	11.6	69.6	8.8	9.4	12.1	1.1	6.6
West Suburban Health Network (Newton/Waltham)	258,243	11.6	82.5	2.8	6.5	8.0	0.8	5.6
Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	706,588	14.2	39.8	26.0	23.0	10.9	1.6	8.6
Blue Hills Community Health Alliance (Quincy)	363,531	12.5	83.1	6.1	2.1	8.5	1.1	5.9
Four (For) Communities (Holyoke)	158,434	12.5	67.3	1.6	29.5	1.5	1.7	7.0
Greater Brockton Community Health Network	229,083	14.0	73.3	11.9	5.5	9.1	1.8	8.6
South Shore Community Partners in Prevention (Plymouth)	174,915	14.1	96.2	1.3	0.8	1.7	0.8	5.4
Health & Education Response (Attleboro/Taunton)	230,976	14.8	91.8	2.1	2.9	2.9	1.3	6.9
Partners for a Healthier Community (Fall River)	138,244	10.9	92.1	3.2	2.3	2.2	2.3	8.6
Greater New Bedford Community Health Network	198,429	11.6	81.8	3.3	8.4	6.4	1.1	6.4
Cape and Islands Community Health Network	225,198	10.4	91.2	2.0	2.3	4.2	0.9	6.5

Table 3B.(cont'd) Resident Birth Characteristics, Community Health Network Areas (CHNAs), Massachusetts: 1998

CHNA	Births					Deaths[4]			
	Adequate Prenatal Care[3]	Public Payment for Prenatal Care	Unmarried[3]	Teen Mothers 15 to 19 years		Infant Mortality Rate		Neonatal Mortality Rate	
	%	%	%	#	Rate[1]	1998	1996-1998	1998	1996-1998
STATE TOTAL	79.8	24.7	26.0	5,823	28.6	5.1	5.1	3.9	3.8
Community Health Network of Berkshire	77.0	31.2	32.3	117	22.6	4.6	5.4	--[5]	3.5
Upper Valley Health Web (Franklin County)	78.6	28.4	32.1	92	33.5	5.6	5.9	5.6	3.7
Partnership for Health in Hampshire County (Northampton)	85.1	19.0	24.5	79	8.0	5.4	2.8	4.6	2.3
The Community Health Connection (Springfield)	71.5	43.6	43.8	550	53.5	6.9	7.1	4.8	5.6
Greater Southbridge Community Health Network	76.7	21.9	27.6	144	38.1	7.6	4.8	6.2	3.4
Community Partners for Health (Milford)	85.4	9.9	13.6	99	19.1	4.7	3.3	2.6	2.3
Community Health Network of Greater Metro West (Framingham)	86.8	8.8	10.2	146	14.0	4.0	4.3	2.9	3.4
Community Wellness Coalition (Worcester)	71.2	29.8	32.2	362	35.9	8.6	8.1	7.3	6.6
Fitchburg/Gardner Community Health Network	77.0	20.8	25.7	263	30.2	4.2	4.0	3.0	2.8
Greater Lowell Community Health Network	71.8	24.2	26.6	302	34.2	3.7	4.0	3.0	3.0
Greater Lawrence Community Health Network	68.2	38.4	38.2	362	57.8	4.7	6.0	2.9	4.4
Greater Haverhill Community Health Network	82.8	16.0	19.7	116	27.5	3.5	3.7	2.5	3.0
Greater Beverly/Gloucester Community Health Network	90.3	10.4	15.0	45	11.3	6.1	6.6	4.6	4.6
North Shore Community Health Network	79.2	28.1	29.0	284	35.7	6.2	7.1	4.5	5.3
Greater Woburn/Concord/Littleton Community Health Network	84.4	5.8	7.4	45	7.5	2.7	2.4	1.9	1.9
North Suburban Health Alliance (Medford/Malden/Melrose)	82.9	15.3	15.9	94	13.8	5.9	5.6	4.8	4.6
Greater Cambridge/Somerville Community Health Network	82.8	16.7	16.9	107	16.2	2.5	3.6	1.9	2.7
West Suburban Health Network (Newton/Waltham)	88.0	7.2	9.1	44	4.5	2.7	3.9	2.0	3.4
Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	76.7	44.0	41.7	984	44.5	5.2	6.3	3.9	4.4
Blue Hills Community Health Alliance (Quincy)	89.4	12.7	14.2	124	12.4	5.1	4.5	4.0	3.4
Four (For) Communities (Holyoke)	72.8	46.2	44.0	308	54.2	6.1	6.3	5.6	5.1
Greater Brockton Community Health Network	77.5	27.6	31.6	254	31.8	5.6	5.5	5.3	4.3
South Shore Community Partners in Prevention (Plymouth)	87.2	11.5	15.6	106	17.4	4.0	4.6	3.2	3.8
Health & Education Response (Attleboro/Taunton)	83.2	17.1	20.2	194	25.4	5.8	4.6	4.1	3.3
Partners for a Healthier Community (Fall River)	81.2	36.0	37.7	194	43.5	5.9	6.2	5.9	4.9
Greater New Bedford Community Health Network	77.8	38.7	38.6	292	40.9	5.2	3.9	2.6	1.7
Cape and Islands Community Health Network	80.3	25.5	23.9	116	20.0	6.0	4.6	4.3	3.0

[1] Births per 1,000 residents. 1998 birth rates are calculated using the 1997 MISER population estimates (released in November 1999). [2] Mothers who designated themselves as Asian, American Indian or Other. [3] Percentages are calculated only for cases where information is known. [4] Deaths per 1,000 live births. [5] Calculations based on fewer than 5 events are excluded.

NOTE: See Technical Foreword for changes in birth data collection.

Table 4. Age-Specific and Crude Birth Rates, Massachusetts: 1990 and 1998

Mother's Age	1990 Births[1]	1990 Rate	1998 Births	1998 Rate[2]	Percent Change in Rate
12-14	124	1.3	79	0.7	-46.2
15-19	7,258	35.8	5,823	28.6	-20.1
20-24	18,115	70.5	11,819	50.6	-28.2
25-29	29,913	107.5	20,936	81.9	-23.8
30-34	25,687	92.1	26,425	102.8	11.6
35-39	9,795	40.1	13,701	51.6	28.7
40-44	1,522	6.9	2,501	10.0	44.9
45+	46	0.3[3]	119	0.5[3]	62.5
Birth rate, ages 15-44[4]	92,290	62.2	81,205	55.4	-10.9
Crude Birth Rate[5]	92,461	15.4	81,406	13.1	-14.9

[1] Differences in the number of births from previous publications are the result of updating of the birth files. The number of births for all age groups does not always add to the total number of births as mother's age is sometimes not recorded on the birth certificate.
[2] 1998 birth rates are calculated using the 1997 MISER population estimates (released in November 1999). [3] Denominator is female population ages 45-49. [4] Rate represents the total number of births to women age 15-44 per 1,000 women age 15 to 44. [5] Births per 1,000 residents (females and males). Includes births to mothers of all age groups and mothers for whom age is unknown.

Figure 1. Trends in the Number of Births by Mother's Age Group, Massachusetts: 1980-1998

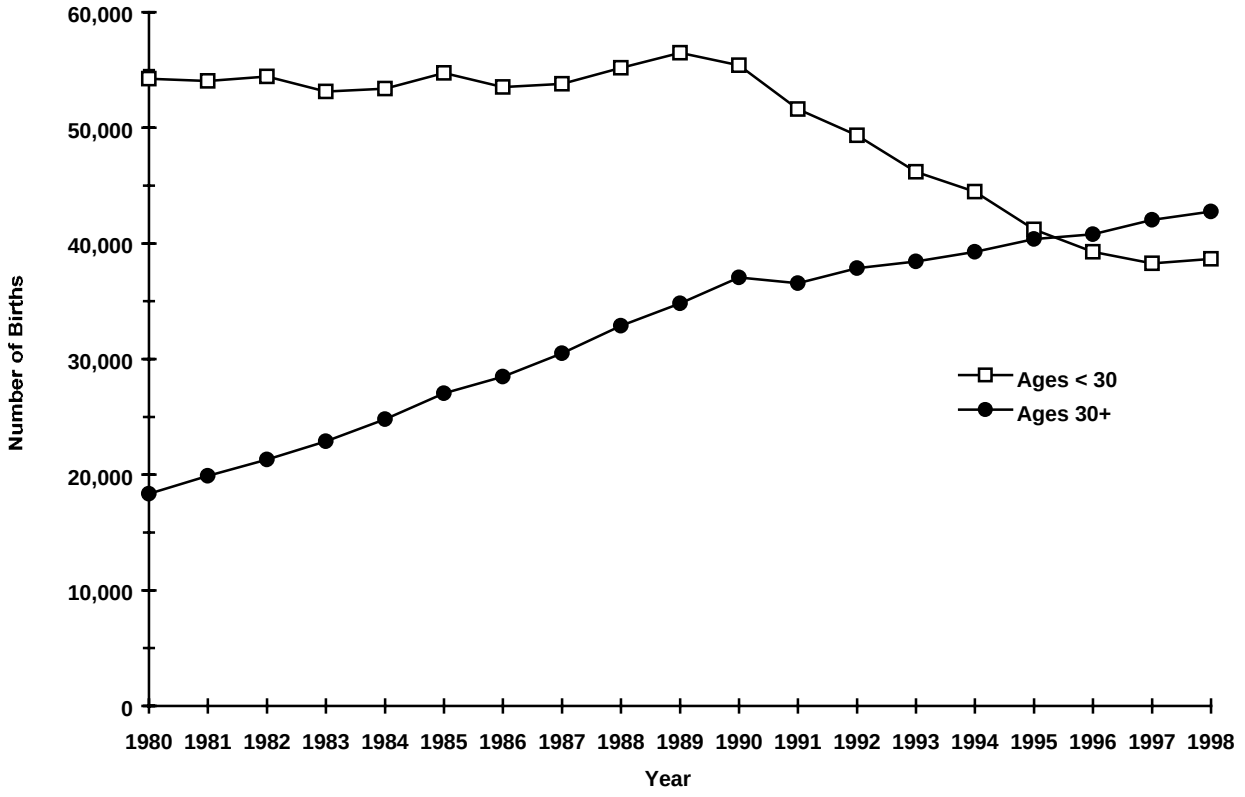
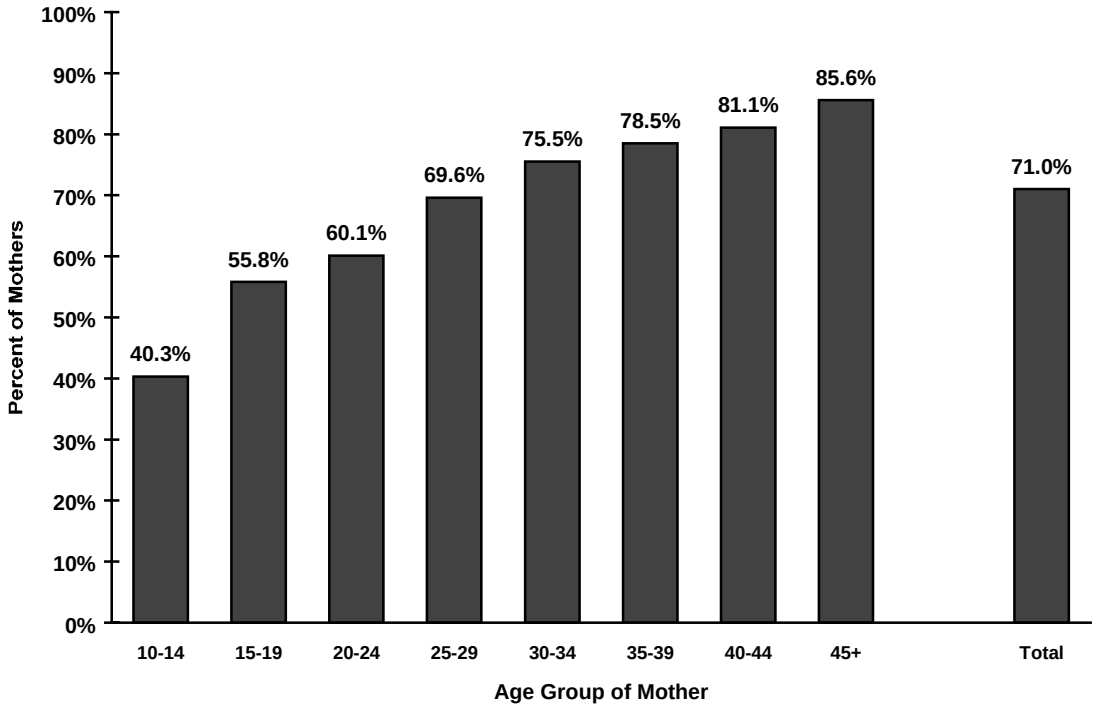


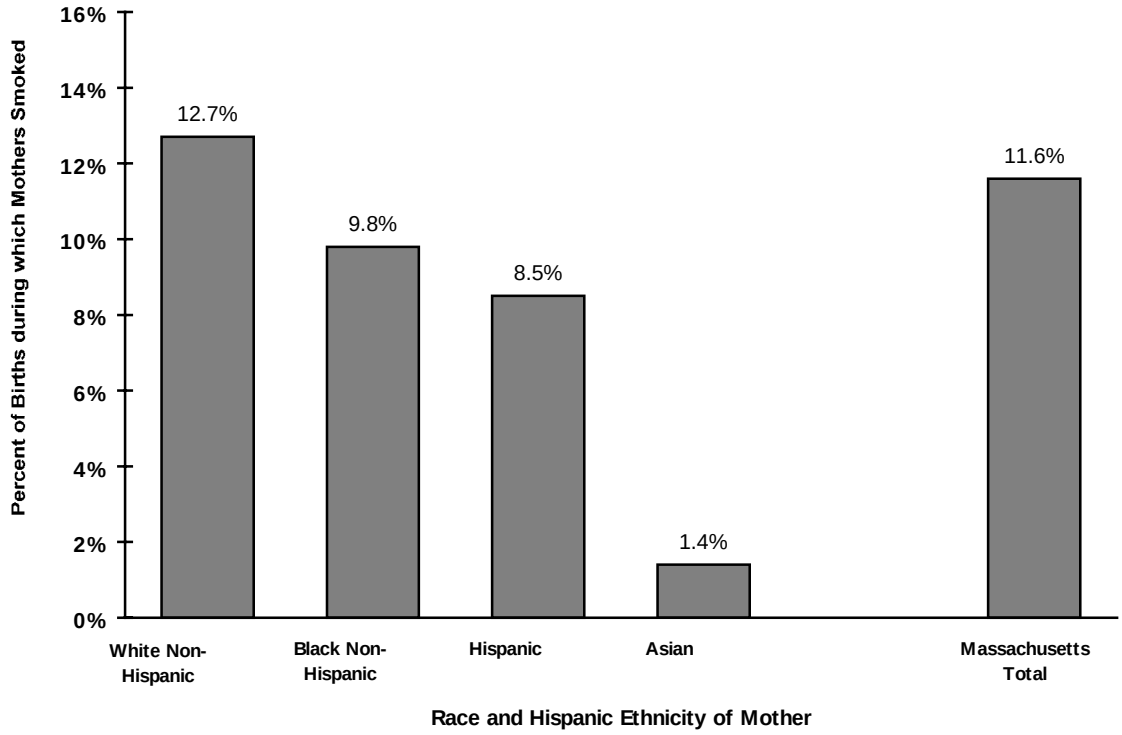
Figure 2. Percent of Mothers Breastfeeding or Intending to Breastfeed[1] by Age Group, Massachusetts[2]: 1998



[1] Information about breastfeeding was reported by the mother at the time the birth certificate was completed.

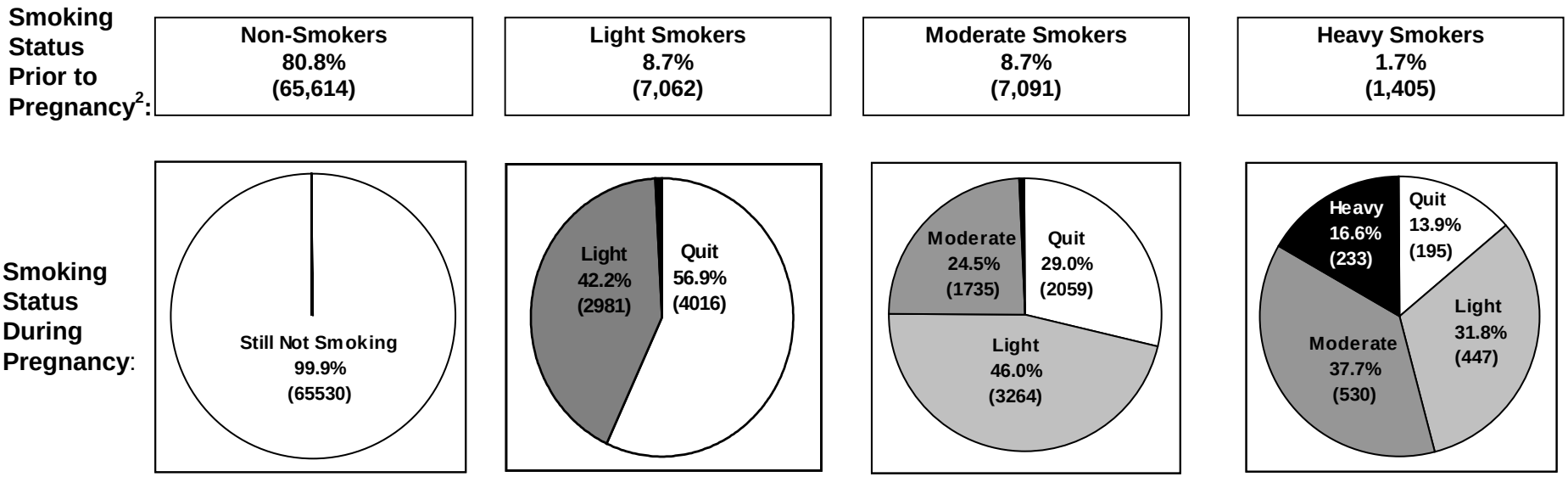
[2] For race-specific breastfeeding rates see Table 14.

Figure 3. Smoking Prevalence[1] During Pregnancy, by Race and Hispanic Ethnicity of Mother, Massachusetts: 1998



[1] Based on information provided on the birth certificate by mother. Mothers with more than one delivery are counted for each birth.

Figure 4. The Distribution of Smoking Status during Pregnancy among Women Who Were Heavy, Moderate, Light or Non-Smokers[1] Prior to Pregnancy, Massachusetts: 1998



99.9% of Non-Smokers continued not smoking (0.1% started smoking)

56.9% of Light Smokers quit smoking (0.9% increased)

75.0% of Moderate Smokers decreased the number of cigarettes smoked daily or quit (0.5% increased)

83.4% of Heavy Smokers decreased the number of cigarettes smoked daily or quit

[1]Light Smokers=1-10 cigarettes daily; Moderate Smokers=11-20 cigarettes daily; Heavy Smokers=21 cigarettes or more daily.
[2]Based on mothers with known smoking status.
NOTE: Not all percentages add up to 100 due to a small number of mothers with unknown smoking status.

Table 5. Parity[1] by Age of Mother, Massachusetts: 1998

Age of Mother (years)		Total Births	1st	2nd	3rd	4th	5th+
STATE TOTAL	#[2]	81,406	35,302	27,700	12,396	4,020	1,988
	%[3]	100.0	43.4	34.0	15.2	4.9	2.4
10-14	#	79	79	0	0	0	0
	%	100.0	100.0	0.0	0.0	0.0	0.0
15-19	#	5,823	4,848	821	128	23	3
	%	100.0	83.3	14.1	2.2	0.4	--[4]
20-24	#	11,819	6,099	3,879	1,373	359	109
	%	100.0	51.6	32.8	11.6	3.0	0.9
25-29	#	20,936	9,814	6,956	2,868	909	389
	%	100.0	46.9	33.2	13.7	4.3	1.9
30-34	#	26,425	9,798	10,152	4,505	1,332	638
	%	100.0	37.1	38.4	17.0	5.0	2.4
35-39	#	13,701	3,885	5,057	2,997	1,130	632
	%	100.0	28.4	36.9	21.9	8.2	4.6
40-44	#	2,501	732	794	509	257	209
	%	100.0	29.3	31.7	20.4	10.3	8.4
45+	#	119	47	40	14	10	8
	%	100.0	39.5	33.6	11.8	8.4	6.7

[1] The number of live births including this birth. [2] Totals include births of unknown parity and unknown age. [3] Percents may not sum to 100.0 due to rounding. [4] Calculations based on fewer than five events are excluded.

Table 6. Number and Percentage Distribution of Births[1] by Plurality and Age, Massachusetts: 1989-1998

		Singletons		Multiples						Total births	
				Twins		Triplets or more		Total Multiples			
Age Group	Year	#	%	#	%	#	%	#	%	#	%
All Ages											
	1989	89,059	97.5	2,174	2.4	81	0.1	2,255	2.5	91,314	100.0
	1990	90,049	97.4	2,312	2.5	99	0.1	2,411	2.6	92,460	100.0
	1991	85,802	97.3	2,285	2.6	89	0.1	2,374	2.7	88,176	100.0
	1992	84,722	97.2	2,347	2.7	133	0.2	2,480	2.8	87,202	100.0
	1993	82,055	97.0	2,367	2.8	205	0.2	2,572	3.0	84,627	100.0
	1994	81,187	96.9	2,357	2.8	214	0.3	2,571	3.1	83,758	100.0
	1995	78,935	96.8	2,429	3.0	198	0.2	2,627	3.2	81,562	100.0
	1996	77,355	96.5	2,621	3.3	194	0.2	2,815	3.5	80,170	100.0
	1997	77,203	96.1	2,856	3.6	262	0.3	3,118	3.9	80,321	100.0
	1998	78,004	95.8	3,114	3.8	288	0.4	3,402	4.2	81,406	100.0
Ages <35											
	1989	79,012	97.6	1,835	2.3	66	0.1	1,901	2.3	80,913	100.0
	1990	79,081	97.5	1,946	2.4	70	0.1	2,016	2.5	81,097	100.0
	1991	74,810	97.5	1,863	2.4	76	0.1	1,939	2.5	76,749	100.0
	1192	73,043	97.3	1,914	2.6	103	0.1	2,017	2.7	75,060	100.0
	1993	70,042	97.2	1,849	2.6	158	0.2	2,007	2.8	72,049	100.0
	1994	68,644	97.2	1,844	2.6	164	0.2	2,008	2.8	70,652	100.0
	1995	65,669	97.2	1,787	2.6	141	0.2	1,928	2.9	67,597	100.0
	1996	63,560	96.9	1,935	2.9	126	0.2	2,061	3.1	65,621	100.0
	1997	62,598	96.7	1,949	3.0	170	0.3	2,119	3.3	64,717	100.0
	1998	62,719	96.4	2,193	3.4	170	0.3	2,363	3.6	65,082	100.0
Ages 35+											
	1989	10,043	96.6	338	3.3	15	0.1	353	3.4	10,396	100.0
	1990	10,968	96.5	366	3.2	29	0.3	395	3.5	11,363	100.0
	1991	10,987	96.2	422	3.7	13	0.1	435	3.8	11,422	100.0
	1992	11,675	96.2	433	3.6	30	0.3	463	3.8	12,138	100.0
	1993	12,007	95.5	518	4.1	47	0.4	565	4.5	12,572	100.0
	1994	12,543	95.7	513	3.9	50	0.4	563	4.3	13,106	100.0
	1995	13,264	95.0	642	4.6	57	0.4	699	5.0	13,963	100.0
	1996	13,793	94.8	686	4.7	68	0.5	754	5.2	14,547	100.0
	1997	14,602	93.6	907	5.8	92	0.6	999	6.4	15,601	100.0
	1998	15,282	93.6	921	5.6	118	0.7	1,039	6.4	16,321	100.0

[1] Differences in the number of births from previous publications are the result of updating of files.

Table 7. Selected Birth Characteristics by Maternal Education, Massachusetts: 1998

	Less than High School		High School Graduate		Some College		College Graduate		More than College	
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]
State Total	9,061	11.2	21,983	27.0	20,294	25.0	20,268	25.0	9,579	11.8
Race										
White non- Hispanic	3,714	6.0	15,524	25.2	16,219	26.3	17,948	29.1	8,291	13.4
Black non-Hispanic	922	16.6	2,040	36.8	1,768	31.9	593	10.7	222	4.0
Hispanic	3,407	39.4	3,027	35.0	1,473	17.0	523	6.0	228	2.6
Asian	639	17.1	821	21.9	523	14.0	1,004	26.8	757	20.2
Age										
20-39	4,011	12.3	11,596	35.5	9,654	29.5	5,782	17.7	1,647	5.0
30-39	1,475	3.7	7,842	19.6	9,788	24.5	13,669	34.2	7,220	18.1
40+	117	4.5	438	16.8	533	20.5	809	31.0	709	27.2
Foreign-born	2,846	31.4	4,392	20.0	2,975	14.7	2,789	13.8	1,833	19.2
Unmarried	6,500	71.7	8,719	39.7	4,684	23.1	935	4.6	300	3.1
Publicly financed prenatal care	6,618	73.7	8,480	39.2	4,032	20.2	756	3.8	157	1.7
Very low birthweight	196	2.2	299	1.4	274	1.4	213	1.1	79	0.8
Low birthweight	879	9.7	1,677	7.6	1,330	6.6	1,172	5.8	579	6.1
Adequate prenatal care	5,413	60.1	16,791	76.7	16,521	81.7	17,429	86.4	8,379	87.9
Cesarean section delivery	1,469	16.2	4,583	20.9	4,540	22.4	4,343	21.5	2,011	21.0
Breast feeding	4,732	52.7	12,838	59.3	13,919	69.7	16,569	84.0	8,468	90.6
Multiple births	214	2.4	806	3.7	874	4.3	956	4.7	545	5.7
Smoking during pregnancy	2,294	25.3	4,287	19.5	2,258	11.1	435	2.1	94	1.0

[1] For state total, race and age categories, percentages are based on row totals. For all other categories, percentages are based on column totals. For Foreign-born, Marital status, Publicly Financed Prenatal Care, Low Birthweight, Very Low Birthweight, Adequacy of Prenatal Care, Cesarean Section, Breast Feeding, Multiple Births, and Smoking During Pregnancy variables, percentages are calculated only for cases where information is known.

CHAPTER 2

INFANT MORTALITY

Overall Changes in Infant Mortality Rate

In 1998, there were 414 infant deaths (children less than one year of age) among Massachusetts residents, 11 fewer than the number of infant deaths in 1997. The infant mortality rate (IMR) in 1998 was 5.1 deaths per 1,000 live births, a 4% decline from the 1997 rate and a 27% decrease since 1990 (Table 8A). The 1998 Massachusetts IMR is 29% below the 1998 U.S. preliminary rate of 7.2 (National Vital Statistics Report, Vol. 47, No. 25, October 5,1999 p. 5).

Race and Ethnicity Patterns in Infant Mortality Rates

The IMR for whites was 4.9 deaths per 1,000 live births in 1998, a 2% decrease from the 1997 rate (Table 8A). The IMR for black infants was 9.3 deaths per 1,000 live births, a 12% decrease from the previous year (10.6 in 1997). Since 1980, there has been a substantial decline in IMRs among black and white infants. From 1980 to 1998, the IMR decreased by 50% for both black infants (a decrease from 18.6 to 9.3) and white infants, (from 9.8 to 4.9). However, the IMR for black infants was consistently more than twice as high as the IMR for white infants during this time period. The 1998 IMR for all 'other' races (including Asian and American Indian) was 2.3, although caution should be used in interpreting these results since they are based only on 10 deaths.

The Massachusetts death certificate was revised in 1989 to include a Hispanic identifier. This revision enables the calculation of white non-Hispanic, black non-Hispanic, and Hispanic infant mortality rates for 1989 through 1998 (Table 8B).

Infants born to black non-Hispanic mothers continue to have the highest IMRs (10.6 per 1,000 live births). This represents a 9% decrease from the 1997 rate, but it is more than two times higher than the IMR for white non-Hispanic infants (4.6 per 1,000 live births).

In 1998, the IMR for Hispanics was unchanged from 1997 (6.7 per 1,000 live births), representing a 7% decline from the 1995 rate. The 1998 IMR of 6.7 for Hispanic infants is 46% higher than the white non-Hispanic rate and 37% below the black non-Hispanic rate.

Asian mothers had the lowest rates of infant mortality compared to the other race/ethnicity groups. This is consistent with prior years with the exception of 1995. In 1998 the Asian IMR was 2.7 deaths per 1,000 live births. (Caution should be used when interpreting this rate since it is based on a small number of deaths.)

Neonatal and post neonatal mortality rates

The overall neonatal mortality rate (deaths among infants less than 28 days old) was 3.9 per 1,000 live births in 1998, a slight decrease from 1997 (Table 8B). Among white non-Hispanic mothers, the neonatal mortality rate decreased 5% from 1997 (3.5 per 1,000 live births in 1998 compared to 3.7 per 1,000 live births in 1997). During this same time period, the neonatal rates increased by 6% among black non-Hispanic mothers (from 8.0 in 1997 to 8.5 in 1998) and decreased by 4% among Hispanic mothers (from 5.2 in 1997 to 5.0 in 1998). There was no change in the number of neonatal deaths among Asians between 1998 and 1997 (7 neonatal deaths).

The overall post neonatal mortality rate (deaths among infants between 28 and 364 days old), was 1.2 in 1998 and 1.3 in 1997. The post neonatal mortality rate among infants of white non-

Hispanic mothers was the same in 1998 as in 1997, 1.1 deaths per 1,000 live births. During the same period, the rates decreased by 41% among infants of black non-Hispanic mothers (from 3.7 in 1997 to 2.2 in 1998), and increased slightly among infants of Hispanic mothers (from 1.5 in 1997 to 1.7 in 1998). The number of post neonatal deaths among Asians remained the same in 1998 as 1997 (3 deaths).

Causes of Infant Death

"Certain conditions originating in the perinatal period" was the leading cause of death for infants of all races and of Hispanic ethnicity. Congenital anomalies represented the second leading cause of death among white non-Hispanic infants, whereas "All Other Causes" was the second and "Symptoms, signs and ill-defined conditions" (primarily sudden infant death syndrome (SIDS)) was the third leading cause of death for black non-Hispanic infants (Table 9A).

The overall leading causes of infant death were conditions originating in the perinatal period (234 deaths) and congenital anomalies (78 deaths, Table 9B). Other causes of infant death include SIDS (22 deaths), diseases of the respiratory system (11 deaths), "Other diseases of nervous system and sense organs" (6 deaths), and homicide (2 deaths). There were 8 fewer deaths from SIDS in 1998 than there were in 1997, representing a 27% decrease. The number of homicide deaths (2) has decreased for the first time since 1994 (3 deaths). (Pre-1997 data not shown).

SIDS remains the leading cause of death in the post neonatal period (28-364 days), while "disorders relating to short gestation and low birthweight" was the leading cause in the neonatal period.

Table 8A. Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race[1], Massachusetts: 1980-1998

INFANT MORTALITY

	State Total[2,3]		White		Black		Asian/Other[4]	
Year	#	Rate[5]	#	Rate[5]	#	Rate[5]	#	Rate[5]
1980	748	10.3	655	9.8	87	18.6	5	4.6
1981	710	9.6	616	9.1	85	18.2	8	6.1
1982	764	10.1	656	9.4	102	21.3	5	3.3
1983	682	9.0	579	8.3	89	19.0	12	7.4
1984	699	8.9	601	8.4	82	16.4	13	7.5
1985	745	9.1	608	8.1	126	23.8	11	6.1
1986	695	8.4	560	7.5	123	22.0	11	4.6
1987	608	7.2	486	6.4	110	17.5	12	4.5
1988	693	7.9	546	7.0	133	19.5	13	3.8
1989	697	7.6	549	6.8	131	17.7	17	4.8
1990	649	7.0	519	6.4	106	13.7	24	6.5
1991	577	6.5	461	6.0	102	13.8	14	3.9
1992	569	6.5	438	5.7	114	15.8	17	4.7
1993	523	6.2	423	5.7	87	12.5	13	3.5
1994	499	6.0	407	5.6	81	12.0	11	2.9
1995	419	5.1	333	4.7	65	10.3	21	5.5
1996	403	5.0	329	4.7	65	10.8	8	2.0
1997	425	5.3	349	5.0	66	10.6	10	2.4
1998	414	5.1	345	4.9	59	9.3	10	2.3

NEONATAL MORTALITY

	State Total[2,3]		White		Black		Asian/Other[4]	
Year	#	Rate[5]	#	Rate[5]	#	Rate[5]	#	Rate[5]
1980	550	7.6	483	7.2	62	13.3	5	4.6
1981	510	6.9	442	6.5	59	12.4	5	3.8
1982	573	7.6	494	7.1	75	15.7	3	--[6]
1983	482	6.3	411	5.9	63	13.4	7	4.3
1984	472	6.0	411	5.8	49	9.8	8	4.6
1985	538	6.6	447	6.0	85	16.0	5	2.8
1986	478	5.8	383	5.2	89	15.9	5	2.1
1987	432	5.1	343	4.6	80	12.7	9	3.4
1988	477	5.4	383	4.9	87	12.8	6	1.8
1989	479	5.2	376	4.7	95	12.8	8	2.3
1990	446	4.8	347	4.3	80	10.3	9	5.1
1991	401	4.5	319	4.1	72	9.8	10	2.8
1992	415	4.8	325	4.3	79	10.9	11	3.1
1993	375	4.4	300	4.1	66	9.5	9	2.4
1994	349	4.2	280	3.8	60	8.9	9	2.4
1995	298	3.6	237	3.3	50	7.9	11	2.9
1996	290	3.6	249	3.5	35	5.8	5	1.2
1997	323	4.0	271	3.9	45	7.2	7	1.7
1998	315	3.9	261	3.7	47	7.4	7	1.6

Table 8A (cont'd). Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race[1], Massachusetts: 1980-1998

POST NEONATAL MORTALITY

	State Total[2,3]		White		Black		Asian/Other[4]	
Year	#	Rate[5]	#	Rate[5]	#	Rate[5]	#	Rate[5]
1980	198	2.7	172	2.6	25	5.3	0	0.0
1981	200	2.7	174	2.6	26	5.8	3	--[6]
1982	191	2.5	162	2.3	27	5.6	2	--[6]
1983	200	2.7	168	2.4	26	5.6	5	3.1
1984	227	2.9	190	2.6	33	6.6	5	2.9
1985	207	2.5	161	2.1	41	7.8	6	3.3
1986	217	2.6	177	2.3	34	6.1	6	2.5
1987	176	2.1	143	1.8	30	4.8	3	--[6]
1988	216	2.5	163	2.1	46	6.7	7	2.0
1989	218	2.4	173	2.1	36	4.9	9	2.5
1990	203	2.2	172	2.1	26	3.4	5	1.4
1991	176	2.0	142	1.8	30	4.1	4	--[6]
1992	154	1.8	113	1.5	35	4.8	6	1.7
1993	148	1.7	123	1.7	21	3.0	4	--[6]
1994	150	1.8	127	1.7	21	3.1	2	--[6]
1995	121	1.5	96	1.3	15	2.4	10	2.6
1996	113	1.4	80	1.1	30	5.0	3	--[6]
1997	102	1.3	78	1.1	21	3.4	3	--[6]
1998	99	1.2	84	1.2	12	1.9	3	--[6]

1. Hispanic origin could not be identified from the Massachusetts death certificate before 1989; thus, Hispanic trend data are not available. Most Hispanics are included in the race category of white. Hispanic infant mortality data for the years 1989 through 1998 are presented in Table 8B. 2. Deaths of infants of unknown race are included in the total calculation. For rate computations, infants of unknown race are allocated into the race categories according to the distribution of births of known race. 3. After the official year-end closing of the 1998 death certificate registration process, four additional infant deaths were identified for whom death certificates had not been filed. These infant deaths are not included in the infant death count. All of these infants were born to mothers who were residents of Boston at the time of their births. Additional information will become available once the death certificates have been completed and officially filed with the Registry of Vital Records and Statistics. 4. Other: American Indian and Other races. 5. Rates are expressed per 1,000 live births. 6. Calculations based on fewer than five events are excluded.

Table 8B. Trends in Infant, Neonatal, and Post Neonatal Mortality, by Race and Hispanic Ethnicity, Massachusetts: 1989-1998

INFANT MORTALITY

	State Total[1,2]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[3]	
Year	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]
1989	697	7.6	482	6.6	126	18.8	67	8.6	15	4.6	7	8.1
1990	649	7.0	442	6.1	98	13.7	77	9.1	24	7.0	8	9.5
1991	577	6.5	381	5.5	101	15.0	80	9.4	14	4.2	1	--[5]
1992	569	6.5	371	5.5	110	16.4	67	7.9	16	4.9	5	5.1
1993	523	6.2	346	5.3	84	13.1	77	9.3	13	3.9	3	--[5]
1994	499	6.0	343	5.3	79	12.6	64	7.6	8	2.4	5	5.3
1995	419	5.1	275	4.4	65	11.1	58	7.2	19	5.5	2	--[5]
1996	403	5.0	289	4.7	63	11.4	40	5.1	8	2.2	2	--[5]
1997	425	5.3	294	4.8	64	11.7	55	6.7	10	2.6	2	--[5]
1998	414	5.1	287	4.6	59	10.6	58	6.7	10	2.7	0	0.0

NEONATAL MORTALITY

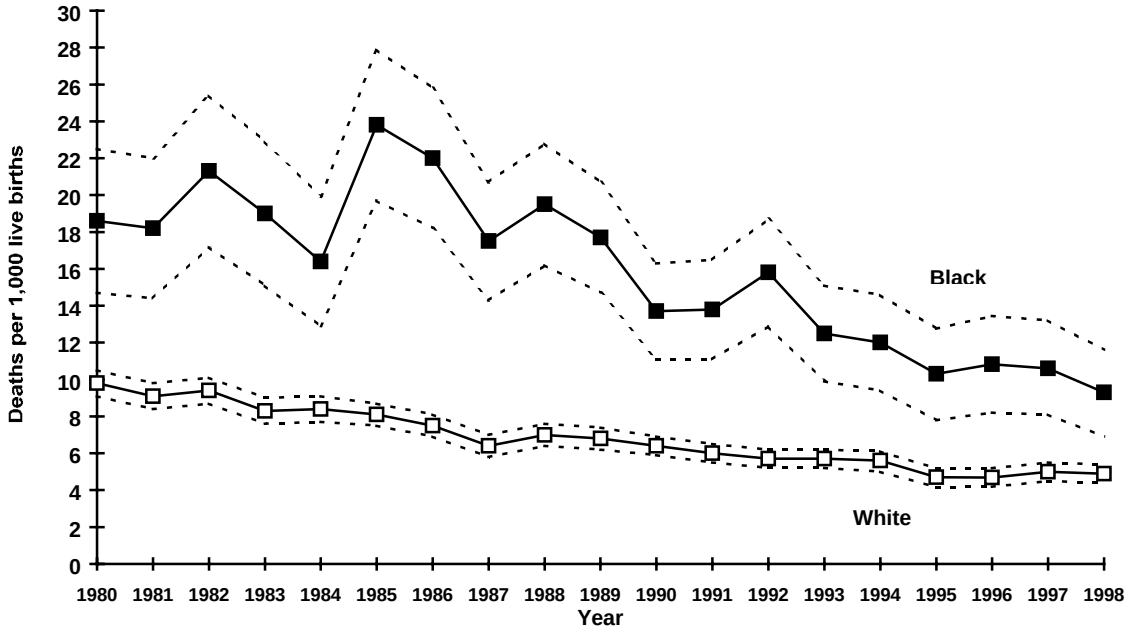
	State Total[1,2]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[3]	
Year	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]
1989	479	5.2	327	4.5	93	13.9	49	6.3	6	1.8	4	--[5]
1990	446	4.8	298	4.1	75	10.5	49	5.8	19	5.5	5	5.5
1991	401	4.5	266	3.9	72	10.7	53	6.2	10	3.0	0	0.0
1992	415	4.8	274	4.0	76	11.4	51	6.0	10	3.0	4	--[5]
1993	375	4.4	245	3.7	64	10.0	55	6.7	9	2.7	2	--[5]
1994	349	4.2	240	3.7	58	9.3	40	4.7	7	2.1	4	--[5]
1995	298	3.6	198	3.1	50	8.5	39	4.8	10	2.9	1	--[5]
1996	290	3.6	222	3.6	34	6.2	27	3.5	5	1.4	1	--[5]
1997	323	4.0	228	3.7	44	8.0	43	5.2	7	1.8	1	--[5]
1998	315	3.9	218	3.5	47	8.5	43	5.0	7	1.9	0	0.0

POST NEONATAL MORTALITY

	State Total[1,2]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[3]	
Year	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]	#	Rate[4]
1989	218	2.4	155	2.1	33	4.9	18	2.3	9	2.8	3	--[5]
1990	203	2.2	144	2.0	23	3.2	28	3.3	5	1.5	3	--[5]
1991	176	2.0	115	1.7	29	4.3	27	3.2	4	--[5]	1	--[5]
1992	154	1.8	97	1.4	34	5.1	16	1.9	6	1.8	1	--[5]
1993	148	1.7	101	1.5	20	3.1	22	2.7	4	--[5]	1	--[5]
1994	150	1.8	103	1.6	21	3.3	24	2.8	1	--[5]	1	--[5]
1995	121	1.5	77	1.2	15	2.6	19	2.3	9	2.6	1	--[5]
1996	113	1.4	67	1.1	29	5.3	13	1.7	3	--[5]	1	--[5]
1997	102	1.3	66	1.1	20	3.7	12	1.5	3	--[5]	1	--[5]
1998	99	1.2	69	1.1	12	2.2	15	1.7	3	--[5]	0	0.0

1. Deaths of infants of unknown race are included in the total calculation. For rate computations, births of infants of unknown race are allocated into the race categories according to the distribution of births of known race. 2. After the official year-end closing of the 1998 death certificate registration process, four additional infant deaths were identified for whom death certificates had not been filed. These infant deaths are not included in the infant death count. All of these infants were born to mothers who were residents of Boston at the time of their births. Additional information will become available once the death certificates have been completed and officially registered with the Registry of Vital Statistics. 3. Other: American Indian and Other races. 4. Rates are expressed per 1,000 live births. 5. Calculations based on fewer than five events are excluded.

Figure 5. Infant Mortality Rates and 95% Confidence Intervals[1] by Race[2], Massachusetts: 1980-1998

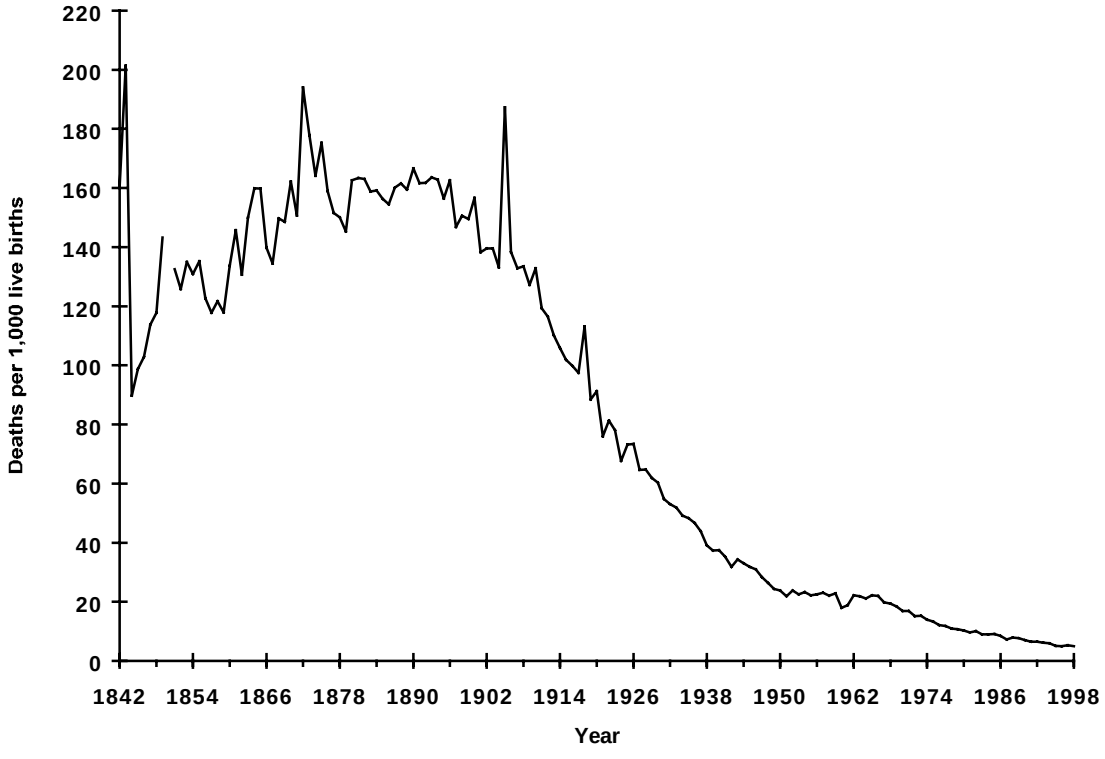


[1]See Appendix for explanation

[2]For rate computations, infant births of unknown race are allocated into race categories according to the distribution of the births of known race.

[3]On tables and graphs which include data prior to June 1986, the race classifications do not include ethnicity; most Hispanics are included

Figure 6. Infant Mortality Rates, Massachusetts: 1842-1998[1]



[1] Data not available for 1850

Table 9A. Infant Deaths by Major Causes, Race and Hispanic Ethnicity, Massachusetts: 1998

Cause of Death	ICD-9 Code	White, Non-Hispanic #	White, Non-Hispanic %	Black, Non-Hispanic #	Black, Non-Hispanic %	Asian, Non-Hispanic #	Asian, Non-Hispanic %	Hispanic #	Hispanic %
TOTAL[1]		287	100%	59	100%	10	100%	58	100%
Congenital anomalies	740-759	63	22.0	5	8.5	2	--[2]	8	13.8
Certain conditions originating in the perinatal period	760-779	150	52.3	40	67.8	6	60	38	65.5
Symptoms, signs, and ill-defined conditions	780-799	20	7.0	6	10.2	0	0.0	2	--[2]
Accidents and adverse effects	E800-E949	10	3.5	1	--[2]	0	0.0	2	--[2]
Homicide	E960-E969	2	--[2]	0	0.0	0	0.0	0	0.0
All other causes	Residual	42	14.6	7	11.9	2	--[2]	8	13.8

1. After the official year-end closing of the 1998 death certificate registration process, four additional infant deaths were identified for whom death certificates had not been filed. These infant deaths are not included in the infant death count. All of these infants were born to mothers who were residents of Boston at the time of their births. Additional information will become available once the death certificates have been completed and officially filed with the Registry of Vital Records and Statistics. 2. Calculations based on fewer than five events are excluded.

Table 9B. Infant, Neonatal, and Post Neonatal Deaths by Cause, Massachusetts: 1998

Cause of Death[1]	ICD-9 Code	Infant (<1 year) #	Infant (<1 year) %[2,3]	Neonatal (<28 days) #	Neonatal (<28 days) %	Post Neonatal (28-364 days) #	Post Neonatal (28-364 days) %
TOTAL[4]		**414**	**100%**	**315**	**100%**	**99**	**100%**
Infectious and parasitic diseases	**001-139**	**5**	**1.2**	**2**	--	**3**	--
Cancer	**140-208**	**3**	**--**	**1**	**--**	**2**	**--**
Diseases of the blood and blood forming organs (anemia)	**280-289**	**1**	**--**	**0**	**0.0**	**1**	**--**
Other diseases of nervous system and sense organs	**323-389**	**6**	**1.4**	**2**	**--**	**4**	**--**
Diseases of the respiratory system	**460-519**	**11**	**2.7**	**0**	**0.0**	**11**	**11.1**
Diseases of digestive system	**520-579**	**4**	**--**	**1**	**--**	**3**	**--**
Congenital anomalies	**740-759**	**78**	**18.8**	**61**	**19.4**	**17**	**17.2**
Anencephalus and similar anomalies	740	3	--	3	--	0	--
Spina Bifida	741	1	**--**	1	--	0	--
Congenital anomalies of central nervous system and eye	742-743	8	**--**	7	--	1	--
Congenital anomalies of heart	745-746	16	**--**	8	--	8	--
Other congenital anomalies of circulatory system	747	5	**--**	5	--	0	--
Congenital anomalies of respiratory system	748	18	**--**	17	--	1	--
Cleft palate and other digestive tract anomalies	749-751	1	**--**	0	--	1	--
Congenital anomalies of genitourinary system	752-753	6	**--**	6	--	0	--
Congenital anomalies of musculoskeletal system	754-756	5	**--**	4	--	1	--
Chromosomal anomalies	758	10	**--**	5	--	5	--
Certain conditions originating in the perinatal period	**760-779**	**234**	**56.5**	**227**	**72.1**	**7**	**7.1**
Newborn affected by maternal conditions which may be unrelated to present pregnancy	760	6	--	6	--	0	**--**
Newborn affected by maternal complications of pregnancy	761	35	--	35	--	0	**--**
Newborn affected by complications of placenta, cord and membrane	762	28	--	28	--	0	**--**
Newborn affected by other complications of labor and delivery	763	4	--	4	--	0	**--**
Disorders relating to short gestation and unspecified low birthweight	765	53	--	53	--	0	**--**
Birth trauma	767	3	--	3	--	0	**--**
Intrauterine hypoxia and birth asphyxia	768	10	--	10	--	0	**--**
Respiratory distress syndrome	769	16	--	16	--	0	**--**
Other respiratory conditions of newborn	770	29	--	25	--	4	**--**
Infections specific to the perinatal period	771	16	--	15	--	1	**--**
Neonatal hemorrhage	772	8	--	8	--	0	**--**
Other and ill-defined conditions originating in the perinatal period	775-779	26	--	24	--	2	**--**
Symptoms, signs, and ill-defined conditions	**780-799**	**28**	**6.8**	**1**	**--**	**27**	**27.3**
Sudden Infant Death Syndrome (SIDS)	798.0	22	--	0	--	22	**--**
Accidents and adverse effects	**E800-E949**	**13**	**3.1**	**3**	--	**10**	**10.1**
Homicide	**E960-E969**	**2**	**--**	**1**	--	**1**	**--**
All other causes	Residual	**29**	**7.0**	**16**	**5.1**	**13**	**13.1**

1. Please refer to the Technical Notes in the Appendix for an explanation of ICD-9 codes. 2. Percents not calculated for subcategories. 3 Calculations based on fewer than five events are excluded. 4. After the official year-end closing of the 1998 death certificate registration process, four additional infant deaths were identified for whom death certificates had not been filed. These infant deaths are not included in the infant death count. All of these infants were born to mothers who were residents of Boston at the time of their births. Additional information will become available once the death certificates for these infants have been completed and officially filed with the Registry of Vital Records and Statistics.

CHAPTER 3

BIRTHWEIGHT AND GESTATIONAL AGE

Overall Birthweight Distribution

In 1998, 6.9% (5,655) of infants were low birthweight (less than 2,500 grams or 5.5 pounds), and 12.1% were 4,000 grams (8.8 pounds) or more (Table 10). The low birthweight rate in Massachusetts was 9.2 % below the national preliminary figure of 7.6% (National Vital Statistics Report, Vol. 47, No. 25, October 5, 1999, p. 2). The low birthweight rate in Massachusetts was approximately the same as in 1997 (7.0%). In 1998, 1.3% (1,070) of infants born to Massachusetts resident women were very low birthweight (less than 1,500 grams or 3.3 pounds), also approximately the same as in 1997 (1.4%).

Patterns of Birthweight by Race and Ethnicity

The proportion of low birthweight infants varied by mother's race and ethnicity. Black non-Hispanic women had the highest proportion of low birthweight infants (11.8%); Hispanic mothers delivered 7.8% low birthweight infants; Asian mothers, 7.5% low birthweight infants; and white non-Hispanic mothers delivered 6.3% low birthweight infants. The proportion of low birthweight deliveries declined slightly for Hispanic women from 1997 to 1998 (8.3% to 7.8%), while rising slightly for Asian and black non-Hispanic infants (data not shown).

The proportion of very low birthweight infants also varied by mother's race and ethnicity. Black non-Hispanic women had the highest proportion of very low birthweight infants: 2.8%; Hispanic mothers delivered 1.8% very low birthweight infants; white non-Hispanic, 1.1%; and Asian mothers, 1.0%.

White non-Hispanic mothers delivered the highest proportion of high birthweight infants, with 13.5% weighing 4,000 grams or more.

The Massachusetts low birthweight rate for black non-Hispanic women, 11.8%, was lower than the US rate for all black women, 13.0%. The rate of low birthweight for Massachusetts Hispanic women (7.8%) was higher than the corresponding preliminary 1998 U.S. rate of 6.4% (National Vital Statistics Report, Vol. 47, No. 25, October 5, 1999, p.2). This may be due to differences in the composition of the Hispanic population in Massachusetts and the nation as a whole. In Massachusetts, the Hispanic population is comprised mainly of Puerto Ricans, Dominicans, and Central Americans. The U.S. Hispanic population has a much greater percentage of Mexicans and Cubans who have relatively low rates of low birthweight. The Massachusetts low birthweight rate for Puerto Ricans, 9.1% in 1998, (Table 2B) was lower than the U.S. Puerto Rican low birthweight of 9.4% in 1997 (NCHS, Health United States, 1999, Table 11, page 119).

Birthweight and Age of Mother

In general, the relation between mother's age and percentage low birthweight follows a U-shaped distribution: the percentage of low birthweight deliveries is highest among women under age 20 years or over age 35 years, and lowest among women between the ages 25-34 years (Table 11). Black non-Hispanic women delivered higher

percentages of low birthweight infants than other race/ethnicity groups for women in age groups over the age of 20 years.

Birthweight and Smoking

Cigarette smoking during pregnancy increases the likelihood of delivering a low birthweight infant. In 1998 in Massachusetts, 10.2% of smoking mothers delivered low birthweight infants while only 6.5% of non-smoking mothers had low birthweight deliveries. Approximately 1 out of 6 (17.2%) black women who smoked during their pregnancy delivered a low birthweight infant (Figure 7).

Preterm Deliveries

In 1998, 7.5% (6,117) of infants born to Massachusetts resident women were preterm (premature) infants, born before the mother had completed the 37th week of pregnancy (Table 12). This is a slight increase from 7.3% in 1997. The greatest increase in the number of preterm infants occurred in women with gestational ages of 32-36 weeks (5.8% to 6.2%)

The proportion of early gestational age varied by mother's race and ethnicity. Black non-Hispanic women had the highest proportion of early deliveries, 11.4%; Hispanic women had 8.6% early deliveries; white non-Hispanic women, 7.0%; and Asian women, 6.9% (Table 12).

Normal Term Deliveries

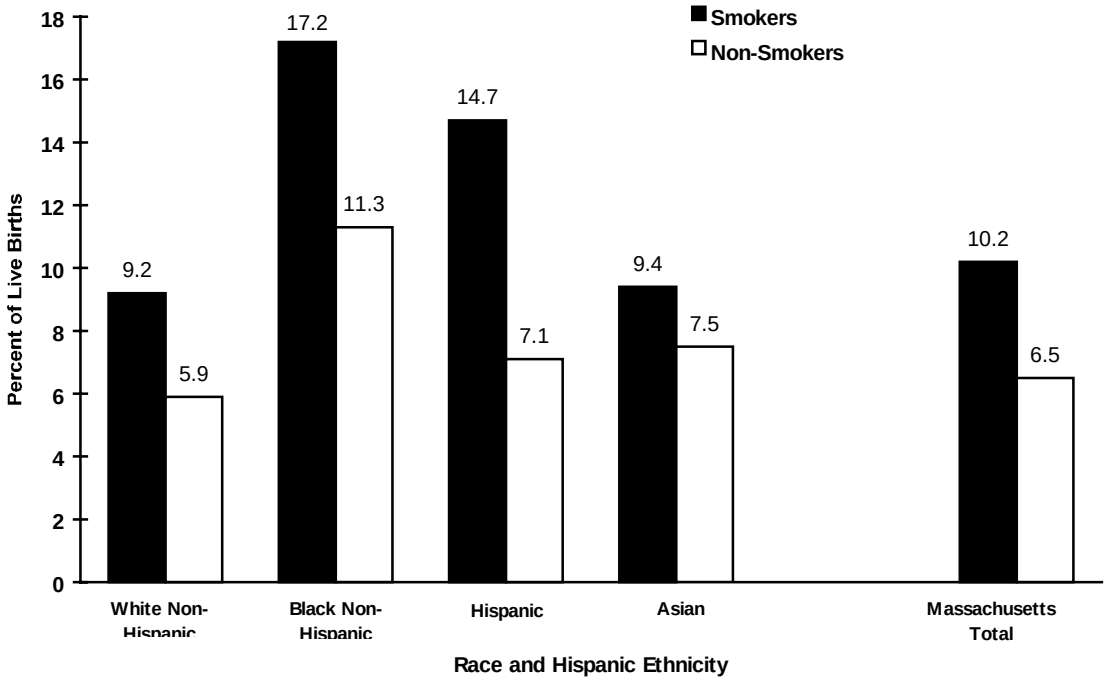
A normal gestational age infant is defined as a baby delivered between the completion of the 37th and 42nd week of pregnancy. In 1998, 91.8% of infants were born at normal gestational age (Table 12). Asian women had the highest proportion of normal gestational age deliveries, 92.6%; white non-Hispanic women, 92.3%; Hispanic women, 91.0%; and black non-Hispanic women, 88.8%.

Table 10. Births by Birthweight, Race and Hispanic Ethnicity, Massachusetts: 1998

Birthweight	Total		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other		Unknown	
	#	%[1]	#	%	#	%	#	%	#	%	#	%	#	%
State Total	81,406	100.0	61,765	100.0	5,549	100.0	8,665	100.0	3,748	100.0	1,530	100.0	149	100.0
<500	108	0.1	67	0.1	21	0.4	14	0.2	1	--[2]	3	--[2]	2	--[2]
500-999	409	0.5	251	0.4	61	1.1	70	0.8	13	0.3	13	0.8	1	--[2]
1000-1499	553	0.7	371	0.6	72	1.3	76	0.9	24	0.6	10	0.7	0	0.0
1500-1999	1,140	1.4	782	1.3	132	2.4	142	1.6	57	1.5	27	1.8	0	0.0
2000-2499	3,445	4.2	2,447	4.0	371	6.7	372	4.3	185	4.9	68	4.4	2	--[2]
2500-2999	11,616	14.3	7,964	12.9	1,032	18.6	1,524	17.6	830	22.1	253	16.5	13	8.7
3000-3499	28,878	35.5	21,193	34.3	2,017	36.3	3,449	39.8	1,605	42.8	592	38.7	22	14.8
3500-3999	25,231	31.0	20,250	32.8	1,418	25.6	2,287	26.4	816	21.8	440	28.8	20	13.4
4000-4499	8,250	10.1	6,989	11.3	361	6.5	614	7.1	182	4.9	97	6.3	7	4.7
4500-4999	1,446	1.8	1,247	2.0	52	0.9	97	1.1	28	0.7	21	1.4	1	--[2]
>=5000	163	0.2	136	0.2	10	0.2	13	0.2	2	--[2]	2	--[2]	0	0.0
Unknown	167	0.2	68	0.1	2	--[2]	7	0.1	5	0.1	4	--[2]	81	54.4
VLBW[3] (0-1499 gms)	1,070	1.3	689	1.1	154	2.8	160	1.8	38	1.0	26	1.7	3	--[2]
LBW[4] (0-2499 gms)	5,655	6.9	3,918	6.3	657	11.8	674	7.8	280	7.5	121	7.9	5	3.4

[1]Percentages are based on column totals. [2]Calculations based on fewer than five events are excluded. [3]VLBW: Very Low Birthweight. [4]LBW: Low Birthweight.

Figure 7. Low Birthweight[1] Among Smoking and Nonsmoking[2] Mothers, by Race and Hispanic Ethnicity, Massachusetts: 1998



[1] Low birthweight: less than 2,500 grams or 5.5 pounds.

[2] Based on information provided on the birth certificate by the mother.

NOTE: Maternal smoking is self-reported, usually following the birth of their child; these data should be interpreted cautiously

Table 11. Low Birthweight[1] by Maternal Age, Race and Hispanic Ethnicity, Massachusetts: 1998

Mother's Age	Total LBW Infants		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other		Unknown	
	#	%[3]	#	%[3]	#	%[3]	#	%[3]	#	%[3]	#	%[3]	#	%[3]
State Total[2]	5,655	6.9	3,918	6.3	657	11.8	674	7.8	280	7.5	121	7.9	5	3.4
<18	216	10.1	65	7.5	37	12.3	84	11.0	16	16.7	14	13.1	0	0.0
18-19	307	8.1	152	7.3	46	10.4	90	8.9	10	11.2	9	6.8	0	0.0
20-24	812	6.9	430	6.1	124	9.9	207	7.8	34	7.1	16	4.5	1	--[4]
25-29	1,287	6.1	900	5.7	136	9.6	138	6.5	81	6.8	30	7.6	2	--[4]
30-34	1,765	6.7	1,362	6.1	184	14.5	110	7.7	77	6.4	31	9.1	1	--[4]
35-39	1,014	7.4	809	6.9	101	14.6	36	6.2	48	8.2	19	11.9	1	--[4]
40+	254	9.7	200	9.2	29	16.5	9	8.2	14	12.3	2	--[4]	0	0.0

[1]Low Birthweight: less than 2,500 grams or 5.5 pounds at birth. [2]State totals include women of unknown age. [3]Percentages are based upon the number of low birthweight infants divided by the total births in each age and race/ethnicity category. [4]Calculations based on fewer than five events are excluded.

Table 12. Births by Gestational Age[1], Race and Hispanic Ethnicity, Massachusetts: 1998

Gestational Age	Total		White non-Hispanic		Black non-Hispanic		Hispanic		Asian		Other[3]		Unknown	
(weeks completed)	#	%[2]	#	%	#	%	#	%	#	%	#	%	#	%
State Total	81,406	100.0	61,765	100.0	5,549	100.0	8,665	100.0	3,748	100.0	1,530	100.0	149	100.0
<20	21	0.0	10	0.0	6	0.1	3	--[7]	0	0.0	2	--[7]	0	0.0
20-23	139	0.2	80	0.1	28	0.5	22	0.3	4	--[7]	3	--[7]	2	--[7]
24-27	316	0.4	190	0.3	44	0.8	60	0.7	11	0.3	11	0.7	0	0.0
28-31	643	0.8	431	0.7	87	1.6	88	1.0	24	0.6	13	0.8	0	0.0
32-35	2,754	3.4	2,013	3.3	259	4.7	316	3.6	109	2.9	56	3.7	1	--[7]
36	2,244	2.8	1,627	2.6	209	3.8	254	2.9	110	2.9	40	2.6	4	--[7]
37-39[4]	29,678	36.5	21,973	35.6	2,165	39.0	3,371	38.9	1,544	41.2	606	39.6	19	12.8
40	30,207	37.1	23,380	37.9	1,796	32.4	3,119	36.0	1,373	36.6	514	33.6	25	16.8
41	12,138	14.9	9,532	15.4	750	13.5	1,155	13.3	464	12.4	228	14.9	9	6.0
42	2,669	3.3	2,102	3.4	181	3.3	242	2.8	90	2.4	51	3.3	3	--[7]
43	100	0.1	67	0.1	6	0.1	20	0.2	6	0.2	1	--[7]	0	0.0
44+	32	0.0	21	0.0	3	--[7]	6	0.1	2	--[7]	0	0.0	0	0.0
Unknown[5]	465	0.6	339	0.5	15	0.3	9	0.1	11	0.3	5	0.3	86	57.7
Very early gestation, <28 weeks	476	0.6	280	0.5	78	1.4	85	1.0	15	0.4	16	1.0	2	--[7]
Preterm, <37 weeks[6]	6,117	7.5	4,351	7.0	633	11.4	743	8.6	258	6.9	125	8.2	7	4.7

[1] A clinical estimate of the number of weeks of pregnancy completed; as estimated by the attendant at birth or the postnatal physician. [2] Percentages are based on column total.
[3] Other races include American Indian and others not specified. [4] Normal gestational age is defined as 37-42 weeks. [5] Estimate of gestational age not provided. [6] Also known as early gestational age, premature delivery, or preterm delivery. [7] Calculations based on fewer than five events are excluded.

CHAPTER 4

ADEQUACY OF PRENATAL CARE

IMPORTANT TECHNICAL NOTE: Changes in Adequacy of Prenatal Care Calculations

There have been two significant changes in the calculation of the Adequacy of Prenatal Care, also known as the Kessner Index. This year's publication reflects computational adjustments in the calculation of Adequacy of Care to make Massachusetts data more comparable to the calculations recommended by the National Center for Health Statistics. Furthermore, this new calculation reduces the number of unknowns from 995 to 469 in 1998. The new adequacy rate of 79.8% in 1998 is very similar to what the rate would have been calculated using the old methodology, 80.2%. Adequacy of prenatal care has been recalculated for 1996, 1997, and 1998. These numbers will differ slightly from previously published data.

The second important change related to adequacy of prenatal care took place in 1996. Until 1996, the month of the first prenatal care visit was recorded on the birth certificate. The new birth certificate records the exact date of the first visit. This change reduced the estimate of women receiving prenatal care in the first trimester. Thus, although trend data are provided in Figure 8, readers should consider data prior to 1996 separately from data for 1996 to the present.

Changes in Adequacy of Prenatal Care, 1980-1995. In 1980, 82.7% of white women and 73.2% of black women received adequate prenatal care (Figure 8). The percentage of white women receiving adequate prenatal care remained fairly constant during the 1980s. In contrast, the proportion of black women receiving adequate care declined from approximately seven out of ten women (73.2%) in 1980 to six out of ten women in 1985 but has been increasing since 1989. The percentage of black women receiving adequate prenatal care rose from 60.0% in 1990 to 70.7% in 1995. The percentage of white women receiving adequate prenatal care rose from 82.5% in 1990 to 85.7% in 1995. (Note that because there was not a separate Hispanic origin question asked on the birth certificate prior to June 1986, Hispanics are counted within the race categories of black and white for all time trend tables. For reference, when a separate Hispanic origin question is asked in addition to a race question most Hispanics classify themselves as white or other race.)

Adequacy of Prenatal Care, White and Black Women: 1996-1998. In 1996, the percentage of white women receiving adequate prenatal care was 81.6%. This proportion was nearly identical to 81.5% in 1998. The percentage of black women receiving adequate prenatal care in 1998 (67.3%) represents a slight increase since 1996 when it was 65.6%, although it is still substantially less than the rate for white women.

Adequacy of Prenatal Care and Low Birthweight

The percentage of low birthweight deliveries declined with increased adequacy of prenatal care in most race/ethnicity groups. In all categories of prenatal care adequacy, black non-Hispanic mothers had the highest percentage of low birthweight infants (Table

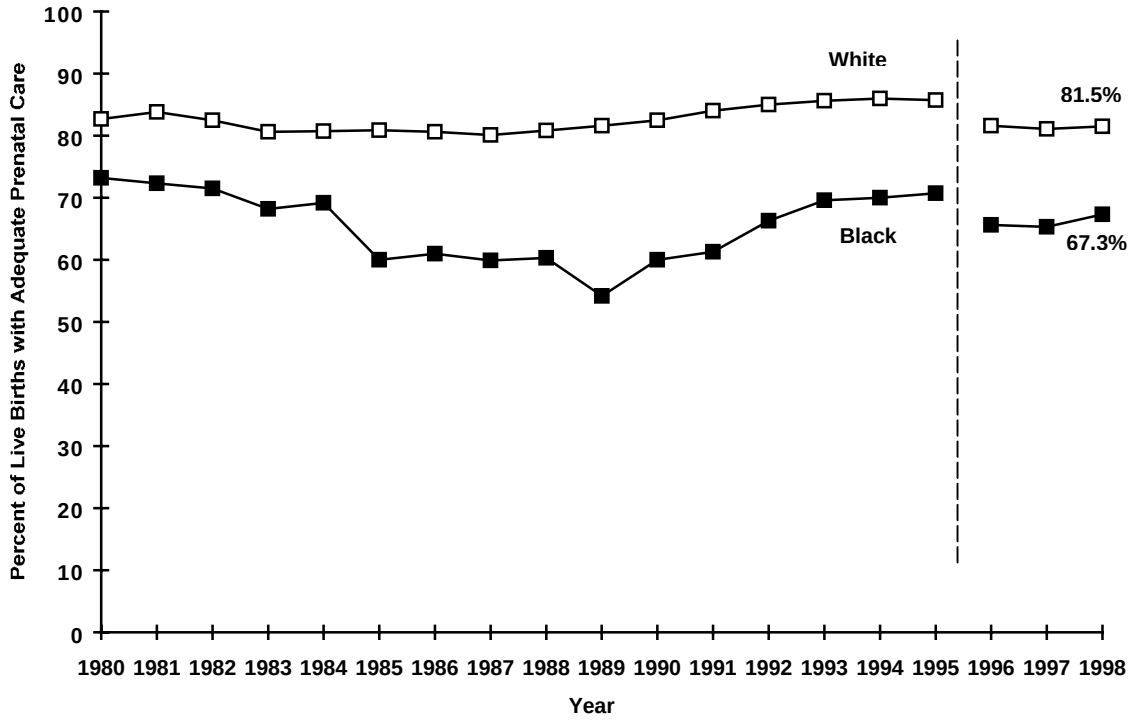
13). Among women who received late or no prenatal care, 9.5% of births were low birthweight. In that prenatal care category, 7.7% of the infants born to white non-Hispanic women were low birthweight; 14.8% of infants born to black non-Hispanic women were low birthweight; 11.7% of the infants born to Hispanic women were low birthweight; and among Asian mothers who received late or no prenatal care, 6.7% of their infants were low birthweight.

In contrast, only 6.5% of Massachusetts women who received adequate prenatal care delivered low birthweight infants. For women with adequate prenatal care, the low birthweight rate was 6.0% for white non-Hispanic women, 11.5% for black non-Hispanic women, 7.3% for Hispanic women, and 6.8% for Asian women.

Adequacy of Prenatal Care in Selected Population Groups

Adequacy of care increased with age of the mother. Among women who were less than 18 years of age at delivery, only 56.0% received adequate prenatal care. Among women who were 35 years of age or older at delivery, 84.1% received adequate prenatal care (Figure 9). Other selected population groups that had lower than the state average of adequate prenatal care included: women ages 20 years or older with fewer than 12 years of education (61.8%); unmarried women (66.2%); mothers who smoked during pregnancy (69.4%); and foreign-born mothers (72.2%). First-time mothers and mothers who reported that they were planning to breastfeed had slightly higher percentages of prenatal care adequacy than the statewide rate of 79.8%.

Figure 8. Trends in Adequacy of Prenatal Care[1,2] by Race[3], Massachusetts: 1980-1998



[1] Calculations are based on births with known Adequacy of Prenatal Care scores.

[2] Due to changes beginning in 1996 in the collection of information on Adequacy of Prenatal Care, caution should be used when comparing these data over time. Refer to the Technical Foreward for an explanation of changes.

[3] On tables and graphs which include data prior to June 1986, the race classifications do not include ethnicity; most Hispanics are

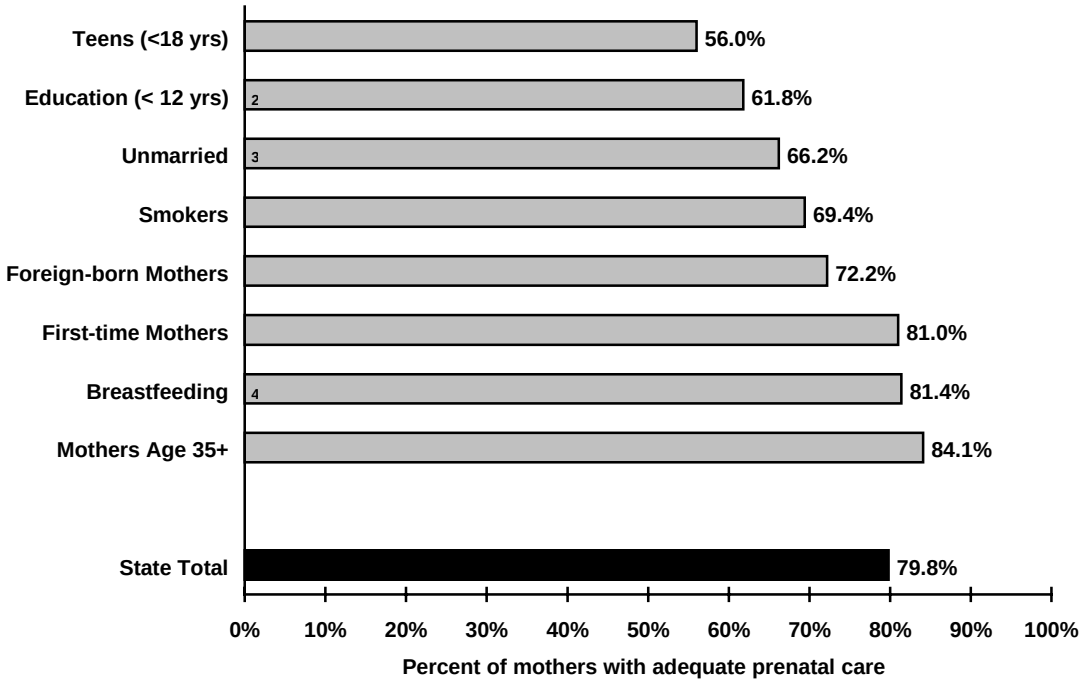
Table 13. Low Birthweight by Level of Prenatal Care and Race and Hispanic Ethnicity, Massachusetts: 1998

Race, Ethnicity, and Birthweight		Total[1]	Level of Prenatal Care[2]		
			Adequate	Intermediate	Late/None
STATE TOTAL	Total Births	80,937	64,616	13,388	2,933
	# LBW[3]	5,591	4,226	1,086	279
	% LBW	6.9	6.5	8.1	9.5
White non- Hispanic	Total Births	61,462	51,384	8,591	1,487
	# LBW[3]	3,869	3,095	659	115
	% LBW	6.3	6.0	7.7	7.7
Black non-Hispanic	Total Births	5,519	3,749	1,290	480
	# LBW[3]	649	433	145	71
	% LBW	11.8	11.5	11.2	14.8
Hispanic	Total Births	8,628	5,773	2,214	641
	# LBW[3]	671	424	172	75
	% LBW	7.8	7.3	7.8	11.7
Asian	Total Births	3,736	2,697	875	164
	# LBW[3]	280	183	86	11
	% LBW	7.5	6.8	9.8	6.7
Other/Unknown	Total Births	1,592	1,013	418	161
	# LBW[3]	122	91	24	7
	% LBW	7.7	9.0	5.7	4.3

[1] All data are based on the 80,937 births with known Adequacy of Prenatal Care data. [2] Detailed explanation of the levels of prenatal care is presented in the Glossary. [3] Low birthweight: less than 2,500 grams or 5.5 pounds.

NOTE: See Technical Foreword for changes in birth data collection.

Figure 9. Adequacy of Prenatal Care[1] for Selected Population Characteristics, Massachusetts: 1998



CHAPTER 5

PRENATAL CARE SOURCE OF PAYMENT

Prenatal Care Payment Source

In 1998, 71.9% of all Massachusetts women had their prenatal care paid for by private insurers, such as Blue Cross/Blue Shield, health maintenance organizations (HMOs), and commercial insurers (Figure 10). Public entitlement programs, including Medicaid/MassHealth and Healthy Start (a Massachusetts-funded program), covered the prenatal care medical expenses of 24.7% of Massachusetts women who gave birth. An additional 0.7% of women paid for their prenatal care by themselves.

Characteristics of Women Who Use Publicly Financed and Private Insured Prenatal Care

Maternal and birth characteristics vary according to whether prenatal care was financed through public programs or through private insurance. Differences in characteristics between those served by public programs and those covered by private insurance may reflect different levels of risk rather than the quality of care received. Among women whose prenatal care was funded by Medicaid/MassHealth, 21.6% were under the age of 20. In contrast, only 2.8% of women whose prenatal care was privately insured were under age 20 (Table 14).

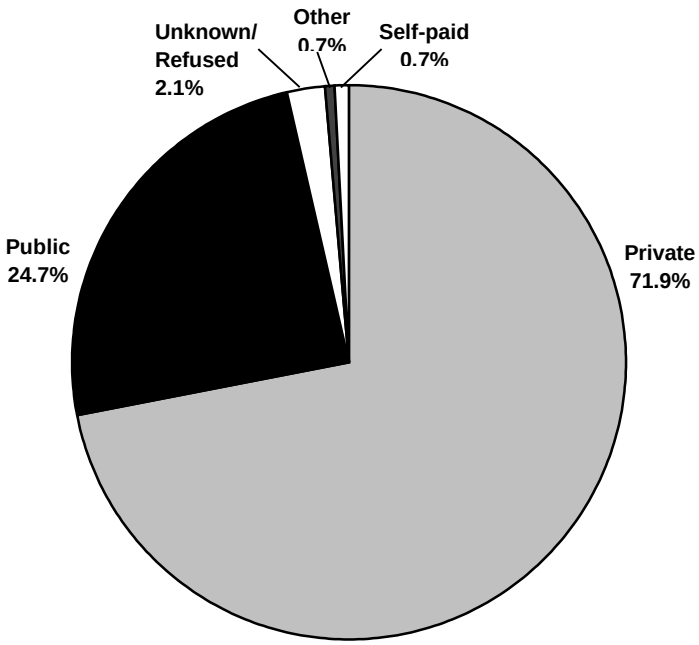
Women whose prenatal care was publicly funded had a higher proportion of low birthweight deliveries (8.4%) than women whose prenatal care was privately insured (6.3%). This difference can be seen among all race/ethnicity groups.

Similarly, women whose prenatal care was publicly financed were less likely to receive adequate prenatal care in all race-ethnicity groups. For example, only 59.3% of black non-Hispanic women whose prenatal care was publicly financed received adequate prenatal care, while 80.3% of black non-Hispanic women with private insurance received adequate prenatal care (Table 14).

In all race/ethnicity groups, women whose prenatal care was publicly financed were less likely to deliver by Cesarean section. Overall, the Cesarean section rate was 17.7% for women with publicly funded prenatal care and 22.2% for women with private insurance. Asian women with publicly funded prenatal care had the lowest Cesarean section rate (11.7%).

Women whose prenatal care was publicly funded were much less likely to report an intent to breastfeed than women who had private insurance. Among white non-Hispanic women, for example, 51.9% of those whose prenatal care was publicly funded reported an intent to breastfeed compared to 74.3% among those whose prenatal care was privately financed.

Figure 10. Distribution of Prenatal Care Payment Source[1], Massachusetts: 1998



[1]The source of payment for prenatal care is a self-reported item on the birth certificate. Private: Blue Cross/Blue Shield, commercial insurance and HMO's. Public: Medicaid, Medicare, Healthy Start, free care, and other government sources. Other: Worker's Compensation and other sources.

Table 14. Birth Characteristics by Source of Prenatal Care Payment, Race and Hispanic Ethnicity, Massachusetts: 1998

Race. Ethnicitv. and Payment Source	Births[1]		Teen Births				Birthweight			
			<18 Years		<20 Years		Verv Low[2]		Low[3]	
	#	%	#	%	#	%	#	%	#	%
STATE TOTAL[4]	81,406	100.0	2,133	2.6	5,902	7.3	1,070	1.3	5,655	6.9
Public	20,070	24.7	1,456	7.3	4,042	20.1	322	1.6	1,683	8.4
Medicaid[5]	17,656	21.7	1,384	7.8	3,818	21.6	299	1.7	1,525	8.6
Other Public[6]	2,414	3.0	72	3.0	224	9.3	23	1.0	158	6.5
Private[7]	58,511	71.9	605	1.0	1,659	2.8	647	1.1	3,682	6.3
White non-Hispanic	61,765	100.0	862	1.4	2,953	4.8	689	1.1	3,918	6.3
Public	9,532	15.4	442	4.6	1,672	17.5	108	1.1	725	7.6
Medicaid[5]	8,567	13.9	423	4.9	1,601	18.7	106	1.2	673	7.9
Other Public[6]	965	1.6	19	2.0	71	7.4	2	--[8]	52	5.4
Private[7]	49,937	80.8	377	0.8	1,146	2.3	506	1.0	2,964	5.9
Black non-Hispanic	5,549	100.0	301	5.4	745	13.4	154	2.8	657	11.8
Public	3,007	54.2	227	7.5	566	18.8	85	2.8	356	11.8
Medicaid[5]	2,717	49.0	219	8.1	542	19.9	74	2.7	318	11.7
Other Public[6]	290	5.2	8	2.8	24	8.3	11	3.8	38	13.1
Private[7]	2,409	43.4	66	2.7	159	6.6	57	2.4	273	11.3
Hispanic	8,665	100.0	765	8.8	1,775	20.5	160	1.8	674	7.8
Public	5,789	66.8	637	11.0	1,495	25.8	107	1.8	462	8.0
Medicaid[5]	4,904	56.6	605	12.3	1,399	28.5	101	2.1	418	8.5
Other Public[6]	885	10.2	32	3.6	96	10.8	6	0.7	44	5.0
Private[7]	2,695	31.1	112	4.2	242	9.0	46	1.7	189	7.0
Asian	3,748	100.0	96	2.6	185	4.9	38	1.0	280	7.5
Public	903	24.1	75	8.3	134	14.8	15	1.7	82	9.1
Medicaid[5]	804	21.5	71	8.8	127	15.8	14	1.7	72	9.0
Other Public[6]	99	2.6	4	--[8]	7	7.1	1	--[8]	10	10.1
Private[7]	2,771	73.9	18	0.6	47	1.7	21	0.8	193	7.0
Other/Unknown[8]	1,530	100.0	107	7.0	239	15.6	26	1.7	121	7.9
Public	829	54.2	74	8.9	173	20.9	7	0.8	58	7.0
Medicaid[5]	655	42.8	66	10.1	148	22.6	4	--[8]	44	6.7
Other Public[6]	174	11.4	8	4.6	25	14.4	3	--[8]	14	8.0
Private[7]	656	42.9	32	4.9	65	9.9	16	2.4	60	9.1

Table 14 (cont'd). Birth Characteristics by Source of Prenatal Care Payment, Race, and Hispanic Ethnicity, Massachusetts: 1998

Race, Ethnicity, and Payment Source	Prenatal Care: Adequate #	Prenatal Care: Adequate %	Prenatal Care: Began 1st Trimester #	Prenatal Care: Began 1st Trimester %	Cesarean Section #	Cesarean Section %	Breastfeeding[10] #	Breastfeeding[10] %
STATE TOTAL[4]	64,616	79.8	68,300	84.3	16,975	20.9	56,591	70.9
Public	12,889	64.4	13,900	69.4	3,533	17.7	11,770	58.7
Medicaid[5]	11,388	64.7	12,298	69.8	3,055	17.4	9,864	55.9
Other Public[6]	1,501	62.4	1,602	66.5	478	19.8	1,907	79.0
Private[7]	49,881	85.4	52,429	89.8	12,952	22.2	43,970	75.2
White non-Hispanic	51,384	83.6	54,095	87.9	13,221	21.5	42,649	70.7
Public	6,543	68.9	6,983	73.5	1,766	18.6	4,941	51.9
Medicaid[5]	5,830	68.3	6,239	73.0	1,555	18.2	4,207	49.1
Other Public[6]	713	74.0	744	77.2	211	21.9	734	76.1
Private[7]	43,191	86.7	45,367	91.0	11,036	22.1	37,102	74.3
Black non-Hispanic	3,749	67.9	4,014	72.7	1,250	22.6	3,798	68.9
Public	1,775	59.3	1,966	65.5	562	18.7	1,848	61.5
Medicaid[5]	1,650	61.0	1,825	67.3	495	18.2	1,635	60.2
Other Public[6]	125	43.4	141	49.0	67	23.1	213	73.4
Private[7]	1,928	80.3	1,995	83.0	666	27.7	1,888	78.4
Hispanic	5,773	66.9	6,197	71.7	1,558	18.0	6,241	72.2
Public	3,594	62.3	3,884	67.3	943	16.3	3,954	68.3
Medicaid[5]	3,071	62.8	3,321	67.9	793	16.2	3,215	65.6
Other Public[6]	523	59.3	563	63.7	150	17.0	739	83.5
Private[7]	2,102	78.3	2,220	82.6	590	21.9	2,166	80.4
Asian	2,697	72.2	2,886	77.2	617	16.5	2,802	75.2
Public	500	55.5	538	59.6	105	11.7	495	54.8
Medicaid[5]	446	55.5	482	60.0	93	11.6	420	52.2
Other Public[6]	54	55.1	56	56.6	12	12.4	75	75.8
Private[7]	2,154	77.9	2,303	83.2	499	18.0	2,270	81.9
Other/Unknown[9]	969	63.7	1,062	69.7	311	20.4	1,063	70.1
Public	473	57.3	525	63.6	155	18.8	528	63.7
Medicaid[5]	388	59.5	428	65.5	117	18.0	383	58.5
Other Public[6]	85	49.1	97	56.1	38	21.8	145	83.3
Private[7]	472	72.0	508	77.4	147	22.5	513	78.4

[1] In the "Births" category, percentages are based on race/ethnicity totals (group column). For all other categories, percentages are based on Birth totals (row total) excluding unknowns for each characteristic. [2] Very low birthweight: less than 1,500 grams or 3.3 pounds. [3] Low Birthweight: less than 2,500 grams or 5.5 pounds. [4] Total births does not equal Public + Private. Other categories of prenatal care payment are also included in Total: Workers' Compensation, self-paid, and other. [5] Medicaid/MassHealth. [6] Other Public: Healthy Start, other government programs, and free care. [7] Private: Blue Cross/Blue Shield, commercial insurance, and HMO. [8] Calculations based on fewer than five events are excluded. [9] Other: Mothers who self-designated other races or for whom race was unknown. [10] Mother was intending to breastfeed at the time the birth certificate was completed.

NOTE: See Technical Foreword for changes in birth data collection.

CHAPTER 6

BIRTHS BY HOSPITAL AND COMMUNITY

In 1998 82,216 births occurred in Massachusetts, a decrease of 13.0% since 1990 *(The percentages and rates provided in Tables 15 and 16 are based on occurrence births and differ from data presented elsewhere in this report, which are based on resident births).*

Low Birthweight Variation by Facility

In 1998, six hospitals at least 10% of the births were low birthweight. These hospitals were: Baystate Medical Center, Beth Israel Deaconess Medical Center, Brigham and Women's Hospital, Massachusetts General Hospital, New England Medical Center, and UMass Memorial Medical Center West Campus (Table 15).

Publicly Funded Delivery Variation by Facility

In three hospitals, 50% or more of the deliveries were paid with public funds: Boston Medical Center (85.4%), Cambridge Hospital (52.4%), and Lawrence General Hospital (55.6%). In seven facilities less than 10% of deliveries were paid with public funds: Boston Regional Medical Center, Emerson Hospital, Newton Wellesley Hospital, North Shore Birth Center, South Shore Hospital, The Birthplace at Wellesley, and Winchester Hospital.

Prenatal Care Adequacy Variation by Facility

In 1998, the facilities with the lowest reported rate of adequacy of prenatal care were: Boston Medical Center (43.8%), Malden Hospital (55.6%), Lawrence General Hospital (58.8%), Cambridge Hospital (60.6%), Lowell General Hospital (61.9%), Caritas Good Samaritan Hospital Cushing Campus (64.5%), and UMass Memorial Medical Center West Campus (65.3%).

Cesarean Section[1] Delivery Variation by Facility

Cesarean section was the method of delivery for 21.0% of the 1998 occurrence births, up slightly from the 1997 rate of 19.9% (Table 16). Calculations are based on births with known method of delivery. Facilities with low rates of Cesarean section deliveries were: Nantucket Cottage Hospital (11.0%, 8 Cesarean section deliveries performed); Tobey Hospital (13.2%, 53 Cesarean section deliveries performed); Martha's Vineyard Hospital (14.4%, 16 Cesarean section deliveries performed); and Heywood Memorial Hospital (14.6%, 75 Cesarean section

[1] Percentages of delivery by method in Table 16 are calculated in following manner:

- Percentage of total Cesarean sections = (Total Cesarean Births / All Births) x 100.
- Percentage primary Cesarean sections = (Primary Cesarean Sections / (All Births - Repeat Cesarean Sections - VBACs)) x 100.
- Percentage repeat Cesarean sections = (Repeat Cesarean Sections / (Repeat Cesarean Sections + VBACs)) x 100.
- Percentage of vaginal birth after Cesarean section delivery, that is, VBACs = (VBAC deliveries / (Repeat Cesarean Sections + VBAC)) x 100. Please note: the sum of the percentages of repeat Cesarean section deliveries + VBACs = 100% of all deliveries of mothers with a prior Cesarean section.

deliveries performed). Seven hospitals had Cesarean section delivery rates of 25% or more (Beth Israel Deaconess Medical Center, Boston Regional Medical Center, Fairview Hospital, Morton Hospital, North Adams Regional Hospital, Quincy Hospital, and St. Elizabeth's Medical Center of Boston).

Primary Cesarean section delivery rates were under 10% at Heywood Hospital, Malden Hospital (6 cesarean deliveries in total), Nantucket Cottage Hospital, and Tobey Hospital. Primary Cesarean section delivery rates were over 20% at Beth Israel Deaconess Medical Center and Morton Hospital.

Repeat Cesarean section delivery rates were lowest at Berkshire Medical Center, Hale Hospital, Martha's Vineyard Hospital (less than ten deliveries by this method), Mount Auburn Hospital, Nantucket Cottage hospital, St. Vincent Hospital, Sturdy Memorial Hospital, and Tobey Hospital. Hospitals with high rates of repeat Cesarean section deliveries include: Holyoke Hospital (80.0%), North Shore Medical Center (81.2%), Lawrence General Hospital (81.8%), New England Medical Center (82.0%), Charlton Memorial hospital (82.4%), Quincy Hospital (82.9%), Newton Wellesley Hospital (83.1%).

Vaginal Birth after Cesarean Section (VBAC) Deliveries

In 1998, among women with a previous Cesarean section, 32.7 % (2,823) had a vaginal birth after a Cesarean section delivery (VBAC). In 1997, 33.5% (2,764) had a VBAC and in 1996, 34.0% (2,921) had a VBAC. In 1995 the VBAC rate was 31.6%; in 1994, the VBAC rate was 30.2%; in 1993, the VBAC rate was 27.4%; in 1992, 24.8%; in 1991, 24.1%; in 1990, 22.3%; and in 1989, 21.0% (trend data not shown).

Since the sum of the percentage of repeat cesarean section deliveries plus VBACs equals 100% of all births to mothers with a prior Cesarean section, facilities with the lowest repeat Cesarean section delivery rates had the highest VBAC rates. In total, thirteen hospitals had VBAC rates over 40%.

Table 15. Birth Characteristics by Licensed Maternity Facility[1], Massachusetts: 1998

Facility	Location	Occurrence Births[2]	Low Birthweight	Public Payment for Delivery[3]	Adequate Prenatal Care
STATE TOTAL[4,5]		82,216	6.9	24.6	79.7
Anna Jaques Hospital	Newburyport	856	4.9	10.9	84.4
Baystate Medical Center	Springfield	5,219	10.6	40.8	73.1
Berkshire Medical Center	Pittsfield	859	4.1	30.7	73.9
Beth Israel Deaconess Medical Center	Boston	5,182	11.1	15.5	79.3
Beverly Hospital	Beverly	2,556	3.6	19.4	87.4
Boston Medical Center	Boston	1,704	9.4	85.4	43.8
Boston Regional Medical Center	Stoneham	1,181	4.1	4.6	81.0
Brigham and Women's Hospital	Boston	9,395	11.0	17.1	96.9
Brockton Hospital	Brockton	1,062	7.7	37.1	73.0
Cambridge Birth Center	Cambridge	35	0.0	40.0	74.3
Cambridge Hospital	Cambridge	653	4.6	52.4	60.6
Cape Cod Hospital	Barnstable	1,032	4.8	25.9	81.3
Caritas Good Samaritan Medical Center Cushing Campus	Brockton	1,250	4.9	37.1	64.5
Caritas Norwood Hospital	Norwood	1,022	2.5	10.6	89.7
Charlton Memorial Hospital	Fall River	1,617	6.9	33.9	80.9
Cooley-Dickinson Hospital	Northampton	917	3.3	18.7	86.8
Deaconess/Waltham Hospital	Waltham	306	3.6	29.7	80.3
Emerson Hospital	Concord	1,413	3.4	4.0	85.4
Fairview Hospital	Great Barrington	150	4.0	30.9	81.1
Falmouth Hospital	Falmouth	617	3.1	28.5	77.8
Franklin Medical Center	Greenfield	555	3.1	31.6	81.8
Hale Hospital	Haverhill	448	3.8	41.3	73.8
Harrington Memorial Hospital	Southbridge	461	3.9	39.3	85.2
Heywood Memorial Hospital	Gardner	515	4.1	30.7	74.3
Holy Family Hospital and Medical Center	Methuen	1,195	5.1	18.7	75.5
Holyoke Hospital	Holyoke	480	5.0	45.6	68.8
Jordan Hospital	Plymouth	792	3.3	24.5	69.6
Lawrence General Hospital	Lawrence	1,453	4.6	55.6	58.8
Leominster Hospital	Leominster	1,514	4.0	27.4	77.5
Lowell General Hospital	Lowell	2,231	5.5	33.8	61.9
Malden Hospital	Malden	41	7.3	28.2	55.6
Martha's Vineyard Hospital	Oak Bluffs	111	3.6	30.6	84.7
Mary Lane Hospital	Ware	234	3.4	34.6	78.5
Massachusetts General Hospital	Boston	2,449	10.7	31.3	68.2

Table 15. (cont'd) Births Characteristics by Licensed Maternity Facility[1], Massachusetts: 1998

Facility	Location	Occurrence Births[2]	Low Birthweight	Public Payment for Delivery[3]	Adequate Prenatal Care
Melrose-Wakefield Hospital	Melrose	1,587	4.3	23.4	85.6
Mercy Hospital Center for Health	Springfield	694	2.4	46.0	73.5
Metro West Medical Center - Framingham Union Campus	Framingham	2,527	4.6	12.6	92.8
Milford-Whitinsville Hospital	Milford	611	3.4	25.2	82.3
Morton Hospital	Taunton	719	4.3	36.0	80.5
Mount Auburn Hospital	Cambridge	1,227	3.3	10.1	87.5
Nantucket Cottage Hospital	Nantucket	73	0.0	27.4	76.1
New England Medical Center	Boston	1,488	21.5	34.6	84.5
Newton Wellesley Hospital	Newton	3,808	3.8	1.6	84.7
North Adams Regional Hospital	North Adams	335	3.6	31.9	83.0
North Shore Birth Center	Beverly	88	0.0	9.1	79.5
North Shore Medical Center	Salem	1,741	4.7	27.6	74.5
Quincy Hospital	Quincy	503	2.2	30.0	77.2
Saint Vincent Hospital	Worcester	2,047	3.6	17.0	79.8
Saints Memorial Medical Center	Lowell	587	4.9	29.5	74.0
South Shore Hospital	Weymouth	3,465	4.4	5.0	95.2
St. Elizabeth's Medical Center of Boston	Boston	1,647	9.4	27.3	82.6
St. Luke's Hospital	New Bedford	1,637	4.9	45.6	77.0
Sturdy Memorial Hospital	Attleboro	808	4.2	25.1	77.7
The Birthplace At Wellesley	Wellesley	66	0.0	3.0	69.7
Tobey Hospital	Wareham	520	2.1	32.6	77.4
UMass Memorial Medical Center - West Campus	Worcester	4,130	11.3	28.1	65.3
Winchester Hospital	Winchester	2,135	4.2	3.1	80.4
All Other Hospitals		4	0.0	0.0	25.0
Home births, enroute, other		264	4.5	32.8	53.2

[1] A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. [2] See Glossary for definitions of occurrence births. [3] Public payment for delivery includes Medicaid/Commonhealth, Medicare, Healthy Start, other government programs, and free care.
[4] Percentages calculated on births with known method of delivery. [5] The percentages provided in this row are based on occurrence births and may differ from data presented elsewhere in this book which are based on resident births. For percentage calculations, denominators exclude unknown values.

Note: Malden Hospital closed to births on February 9, 1998. Quincy Hospital closed to births on November 1998. Name changes: Caritas Norwood Hospital from Norwood Hospital, UMASS Memorial Medical Center – West Campus from Memorial Hospital.

Table 16. Cesarean Section Deliveries and Vaginal Births after Cesarean Section (VBACs) by Licensed Maternity Facility[1], Massachusetts: 1998

Facility	Occurrence Births[2]	Total C-Sections		Primary C-Section		Repeat C-Section		VBACs	
		#	%[3,4]	#	%[3,5]	#	%[3,6]	#	%[7]
STATE TOTAL	82,216	17,190	21.0	11,383	15.5	5,807	67.3	2,823	32.7
Anna Jaques Hospital	856	173	20.2	122	15.7	51	64.6	28	35.4
Baystate Medical Center	5219	987	18.9	652	13.9	335	63.8	190	36.2
Berkshire Medical Center	859	152	17.7	93	12.4	59	55.1	48	44.9
Beth Israel Deaconess Medical Center	5182	1307	25.2	921	20.2	386	62.1	236	37.9
Beverly Hospital	2556	460	18.0	280	12.3	180	62.5	108	37.5
Boston Medical Center	1704	347	20.4	244	15.7	103	69.1	46	30.9
Boston Regional Medical Center	1181	298	25.2	176	17.2	122	76.3	38	23.8
Brigham and Women's Hospital	9395	2090	22.4	1451	17.3	639	65.6	335	34.4
Brockton Hospital	1062	188	17.7	115	12.1	73	64.0	41	36.0
Cambridge Birth Center	35	0	0.0	0	0.0	0	-	0	-
Cambridge Hospital	653	106	16.2	71	11.9	35	61.4	22	38.6
Cape Cod Hospital	1032	214	20.7	126	14.0	88	65.2	47	34.8
Caritas Good Samaritan Medical Center Cushing Campus	1250	289	23.1	184	16.7	105	70.0	45	30.0
Caritas Norwood Hospital	1022	237	23.2	140	16.1	97	62.6	58	37.4
Charlton Memorial Hospital	1617	301	18.6	184	12.5	117	82.4	25	17.6
Cooley-Dickinson Hospital	917	162	17.7	106	12.9	56	58.3	40	41.7
Deaconess/Waltham Hospital	306	49	16.0	30	10.9	19	61.3	12	38.7
Emerson Hospital	1413	289	20.5	189	15.2	100	59.5	68	40.5
Fairview Hospital	150	38	25.5	23	18.0	15	71.4	6	28.6
Falmouth Hospital	617	123	19.9	89	15.8	34	64.2	19	35.8
Franklin Medical Center	555	93	16.8	66	13.0	27	58.7	19	41.3
Hale Hospital	448	82	18.3	45	11.7	37	57.8	27	42.2
Harrington Memorial Hospital	461	92	20.0	53	13.3	39	63.9	22	36.1
Heywood Memorial Hospital	515	75	14.6	40	8.7	35	66.0	18	34.0
Holy Family Hospital and Medical Center	1195	282	23.6	200	18.6	82	67.2	40	32.8
Holyoke Hospital	480	90	18.8	50	11.6	40	80.0	10	20.0
Jordan Hospital	792	192	24.3	107	16.1	85	68.0	40	32.0
Lawrence General Hospital	1453	258	17.8	159	11.9	99	81.8	22	18.2
Leominster Hospital	1514	306	20.2	195	14.4	111	68.9	50	31.1
Lowell General Hospital	2231	434	19.5	260	13.2	174	67.7	83	32.3
Malden Hospital	41	6	15.4	3	8.8	3	60.0	2	40.0
Martha's Vineyard Hospital	111	16	14.4	13	12.9	3	30.0	7	70.0
Mary Lane Hospital	234	53	22.6	29	14.5	24	70.6	10	29.4

Table 16 (cont'd). Cesarean Section Deliveries and Vaginal Births After Cesarean Section (VBACs) by Licensed Maternity Facility[1], Massachusetts: 1998

Facility	Occurrence Births[2]	Total C-Sections		Primary C-Section		Repeat C-Section		VBACs	
		#	%[3,4]	#	%[3,5]	#	%[3,6]	#	%[7]
Massachusetts General Hospital	2449	521	21.3	400	17.6	121	73.3	44	26.7
Melrose-Wakefield Hospital	1587	353	22.2	210	15.1	143	74.1	50	25.9
Mercy Hospital Center for Health	694	140	20.2	98	15.3	42	79.2	11	20.8
Metro West Medical Center - Framingham Union Campus	2527	515	20.4	382	16.2	133	77.8	38	22.2
Milford-Whitinsville Hospital	611	117	19.1	74	13.6	43	64.2	24	35.8
Morton Hospital	719	194	27.2	131	20.9	63	73.3	23	26.7
Mount Auburn Hospital	1227	221	18.0	171	15.1	50	54.9	41	45.1
Nantucket Cottage Hospital	73	8	11.0	4	6.1	4	57.1	3	42.9
New England Medical Center	1488	357	24.0	252	18.5	105	82.0	23	18.0
Newton Wellesley Hospital	3808	890	23.4	668	18.9	222	83.1	45	16.9
North Adams Regional Hospital	335	85	25.4	57	19.2	28	73.7	10	26.3
North Shore Birth Center	88	0	0.0	0	0.0	0	0.0	1	100.0
North Shore Medical Center	1741	395	22.7	244	15.7	151	81.2	35	18.8
Quincy Hospital	503	138	27.4	75	17.6	63	82.9	13	17.1
Saint Vincent Hospital	2047	349	17.0	247	13.5	102	48.1	110	51.9
Saints Memorial Medical Center	587	128	21.9	95	17.6	33	73.3	12	26.7
South Shore Hospital	3465	804	23.2	499	16.4	305	73.7	109	26.3
St. Elizabeth's Medical Center of Boston	1647	418	25.4	271	18.7	147	73.1	54	26.9
St. Luke's Hospital	1637	356	21.8	225	15.6	131	69.3	58	30.7
Sturdy Memorial Hospital	808	139	17.2	73	10.5	66	56.9	50	43.1
The Birthplace At Wellesley	66	0	0.0	0	0.0	0	0.0	3	100.0
Tobey Hospital	520	53	13.2	34	9.3	19	52.8	17	47.2
UMass Memorial Medical Center - West Campus	4130	780	18.9	493	13.5	287	60.3	189	39.7
Winchester Hospital	2135	440	20.8	264	14.3	176	65.4	93	34.6
All Other Hospitals	4	0	0.0	0	0.0	0	-	0	-
Home births, enroute, other	264	0	0.0	0	0.0	0	0.0	5	100.0

[1] A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. [2] See Glossary for definitions of occurrence and Cesarean births, primary and repeat. The percentages provided in this table are based on occurrence births and may differ from data presented elsewhere in this book which are based on resident births. [3] The percentage of Cesarean births reported is not adjusted for risk factors such as mother's age, birthweight, or complications of labor and delivery, which would influence the number of procedures in a particular facility. Caution should be used when comparing unadjusted percentages. [4] Percentages calculated on births with known method of delivery. Percentage of total Cesarean sections= (total Cesarean births/all births) x 100. [5] Percentage primary Cesarean sections=(primary cesarean sections/all births-repeat Cesarean sections-VBACs) x 100. [6] Percentage repeat Cesarean sections= (repeat Cesarean sections/(repeat Cesarean sections + VBACs)) x100. [7] Percentage VBACs= (VBAC deliveries/(repeat Cesarean sections + VBAC)) x 100.

Note: Malden Hospital closed to births on February 9, 1998. Quincy Hospital closed to births on November 1998. Name changes: Caritas Norwood Hospital from Norwood Hospital, UMASS Memorial Medical Center – West Campus from Memorial Hospital.

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
STATE TOTAL	**82,216**	**81,406**	**5,484**	**5,902**	**414**	**315**
Abington	0	208	10	13	1	1
Acton	0	245	14	1	1	1
Acushnet	0	105	7	7	2	1
Adams	0	83	5	4	1	1
Agawam	0	320	13	22	1	1
Alford	0	2	0	0	0	0
Amesbury	0	225	19	8	1	1
Amherst	2	163	7	8	1	1
Andover	0	352	20	5	0	0
Arlington	4	531	40	9	2	2
Ashburnham	0	56	--[1]	6	0	0
Ashby	0	30	--[1]	0	0	0
Ashfield	1	13	--[1]	0	0	0
Ashland	1	223	16	3	1	0
Athol	1	126	9	20	0	0
Attleboro	809	592	40	45	0	0
Auburn	1	147	8	4	0	0
Avon	0	47	5	2	0	0
Ayer	2	115	5	12	0	0
Barnstable	1,035	511	34	31	4	1
Barre	0	59	--[1]	2	0	0
Becket	1	16	0	0	0	0
Bedford	1	232	14	2	1	1
Belchertown	1	157	10	5	2	2
Bellingham	0	226	14	12	2	2
Belmont	0	286	12	1	1	1
Berkley	0	95	9	4	3	3
Berlin	0	27	--[1]	0	0	0
Bernardston	0	11	--[1]	0	0	0
Beverly	2,644	472	19	15	1	1
Billerica	0	553	23	21	0	0
Blackstone	0	117	8	9	1	1
Blandford	0	11	0	0	0	0
Bolton	0	64	9	1	0	0
Boston	21,908	7,883	694	836	46	34
Bourne	0	253	8	5	0	0
Boxborough	0	68	--[1]	1	1	0
Boxford	0	85	5	1	0	0
Boylston	0	56	--[1]	1	0	0
Braintree	0	386	20	10	1	0
Brewster	0	77	--[1]	2	0	0

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Bridgewater	0	295	26	10	2	2
Brimfield	1	38	--[1]	4	0	0
Brockton	2,313	1,453	147	180	14	13
Brookfield	1	26	5	4	0	0
Brookline	3	655	44	12	0	0
Buckland	0	17	--[1]	1	0	0
Burlington	1	333	20	11	2	1
Cambridge	1,920	1,034	76	31	2	1
Canton	0	239	15	1	3	3
Carlisle	0	52	--[1]	0	0	0
Carver	0	136	11	10	0	0
Charlemont	0	19	0	2	0	0
Charlton	1	144	15	9	3	3
Chatham	2	43	--[1]	2	0	0
Chelmsford	2	457	35	10	4	4
Chelsea	2	664	58	103	4	4
Cheshire	0	37	--[1]	2	1	0
Chester	0	16	--[1]	1	0	0
Chesterfield	0	8	0	1	0	0
Chicopee	1	612	43	72	7	6
Chilmark	3	9	0	0	0	0
Clarksburg	0	19	--[1]	2	0	0
Clinton	0	189	10	10	0	0
Cohasset	0	86	0	0	0	0
Colrain	0	22	6	2	2	2
Concord	1,414	161	7	3	1	1
Conway	1	21	0	0	0	0
Cummington	0	13	--[1]	0	0	0
Dalton	0	67	5	5	0	0
Danvers	0	246	18	8	0	0
Dartmouth	0	251	15	18	0	0
Dedham	1	314	19	7	2	2
Deerfield	0	53	--[1]	1	0	0
Dennis	0	130	13	13	0	0
Dighton	0	52	--[1]	2	1	0
Douglas	0	135	8	6	1	0
Dover	0	72	--[1]	0	0	0
Dracut	0	417	25	15	1	1
Dudley	0	121	14	4	1	1
Dunstable	0	35	--[1]	0	0	0
Duxbury	2	163	--[1]	1	1	1
East Bridgewater	0	192	19	9	1	1
East Brookfield	0	21	0	2	0	0
East Longmeadow	0	155	12	4	0	0
Eastham	0	26	--[1]	1	0	0

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Easthampton	1	185	13	11	0	0
Easton	0	272	19	4	0	0
Edgartown	0	42	5	0	0	0
Egremont	1	7	0	0	0	0
Erving	0	12	--[1]	0	0	0
Essex	0	34	--[1]	2	0	0
Everett	0	498	49	33	5	4
Fairhaven	0	166	11	13	1	1
Fall River	1,618	1,104	101	156	8	8
Falmouth	618	240	16	20	0	0
Fitchburg	6	554	39	90	1	0
Florida	0	10	--[1]	1	0	0
Foxborough	0	253	16	2	1	0
Framingham	2,528	984	82	46	2	2
Franklin	2	526	37	9	0	0
Freetown	0	63	--[1]	6	0	0
Gardner	515	233	21	29	0	0
Gay Head (Aquinnah)	0	2	0	1	0	0
Georgetown	0	121	--[1]	0	1	1
Gill	0	10	0	0	0	0
Gloucester	2	325	17	17	3	1
Goshen	0	13	--[1]	1	0	0
Gosnold	0	1	0	0	0	0
Grafton	1	229	17	5	4	4
Granby	0	66	6	4	0	0
Granville	0	24	0	1	0	0
Great Barrington	151	48	5	1	1	1
Greenfield	556	198	14	31	3	3
Groton	0	136	8	2	1	1
Groveland	0	74	--[1]	1	0	0
Hadley	1	31	--[1]	0	0	0
Halifax	0	98	6	4	0	0
Hamilton	0	107	--[1]	2	1	1
Hampden	0	53	5	1	0	0
Hancock	0	4	0	1	0	0
Hanover	0	156	7	3	0	0
Hanson	0	127	8	9	1	1
Hardwick	0	32	--[1]	2	1	1
Harvard	0	57	--[1]	0	0	0
Harwich	1	104	5	8	3	2
Hatfield	1	28	--[1]	1	0	0
Haverhill	448	845	50	82	5	3
Hawley	0	3	0	0	0	0
Heath	0	9	0	0	0	0
Hingham	1	252	7	3	2	1

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Hinsdale	1	19	--[1]	2	0	0
Holbrook	0	161	8	7	0	0
Holden	0	188	16	3	2	2
Holland	1	28	--[1]	3	0	0
Holliston	1	184	6	1	1	1
Holyoke	482	706	51	191	4	4
Hopedale	0	80	--[1]	3	0	0
Hopkinton	2	215	6	1	0	0
Hubbardston	1	53	0	2	0	0
Hudson	1	241	17	15	1	1
Hull	0	146	6	9	0	0
Huntington	0	22	--[1]	2	0	0
Ipswich	1	150	8	6	0	0
Kingston	0	195	7	5	0	0
Lakeville	1	111	5	5	2	0
Lancaster	1	75	6	4	2	2
Lanesborough	0	15	0	1	0	0
Lawrence	1,455	1,405	95	304	11	7
Lee	0	61	--[1]	1	0	0
Leicester	0	103	10	6	1	1
Lenox	2	41	--[1]	1	0	0
Leominster	1,516	637	39	49	5	5
Leverett	0	8	0	0	0	0
Lexington	1	293	13	3	0	0
Leyden	0	5	0	0	0	0
Lincoln	2	54	5	0	0	0
Littleton	1	117	7	3	0	0
Longmeadow	0	159	5	2	1	0
Lowell	2,825	1,686	155	245	8	5
Ludlow	0	185	16	10	0	0
Lunenburg	0	99	--[1]	3	0	0
Lynn	3	1,370	110	194	9	6
Lynnfield	0	116	11	1	1	1
Malden	42	764	62	26	7	5
Manchester-by-the-Sea	0	42	--[1]	0	1	1
Mansfield	0	413	20	8	2	2
Marblehead	0	250	12	0	1	0
Marion	0	52	--[1]	1	0	0
Marlborough	1	556	26	32	1	1
Marshfield	0	381	14	5	2	2
Mashpee	0	132	6	6	0	0
Mattapoisett	0	69	0	1	0	0
Maynard	0	140	6	7	4	3
Medfield	0	154	6	0	0	0
Medford	2	607	46	19	2	2

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Medway	0	189	16	2	1	0
Melrose	1,587	355	14	5	1	0
Mendon	0	60	0	0	0	0
Merrimac	0	86	8	2	0	0
Methuen	1,196	568	36	48	2	1
Middleborough	0	299	23	17	3	1
Middlefield	1	6	0	0	0	0
Middleton	1	82	--[1]	2	0	0
Milford	612	382	29	25	4	2
Millbury	1	148	12	10	4	1
Millis	1	128	8	2	1	0
Millville	0	44	--[1]	6	0	0
Milton	1	317	26	6	5	5
Monroe	0	1	0	0	0	0
Monson	0	95	5	11	0	0
Montague	0	98	6	12	0	0
Monterey	2	9	0	0	0	0
Montgomery	0	7	0	0	0	0
Mount Washington	0	3	0	0	0	0
Nahant	0	42	--[1]	1	0	0
Nantucket	76	125	6	5	2	2
Natick	1	482	29	8	1	1
Needham	0	373	21	2	0	0
New Ashford	0	2	0	0	0	0
New Bedford	1,639	1,314	90	224	8	4
New Braintree	0	9	0	0	0	0
New Marlborough	0	13	0	1	0	0
New Salem	0	2	0	0	0	0
Newbury	0	85	--[1]	0	0	0
Newburyport	856	204	8	11	0	0
Newton	3,812	856	42	7	1	0
Norfolk	0	151	--[1]	1	0	0
North Adams	336	171	10	22	0	0
North Andover	0	362	15	10	0	0
North Attleboro	0	381	26	14	3	3
North Brookfield	0	51	7	5	1	1
North Reading	0	192	17	2	2	2
Northampton	924	248	17	22	2	2
Northborough	0	191	9	7	1	0
Northbridge	0	187	7	15	0	0
Northfield	0	28	--[1]	1	0	0
Norton	0	274	14	9	0	0
Norwell	0	144	6	1	1	0
Norwood	1,022	334	19	5	2	2
Oak Bluffs	111	56	5	2	1	1

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Oakham	0	13	--[1]	0	0	0
Orange	0	76	5	12	0	0
Orleans	0	33	--[1]	0	0	0
Otis	0	10	0	2	0	0
Oxford	0	183	11	16	0	0
Palmer	1	148	14	7	1	1
Paxton	1	31	0	0	0	0
Peabody	1	564	30	19	4	3
Pelham	0	8	0	0	0	0
Pembroke	0	266	24	12	1	1
Pepperell	0	187	19	10	0	0
Peru	0	8	0	0	0	0
Petersham	0	14	--[1]	1	0	0
Phillipston	0	18	--[1]	2	0	0
Pittsfield	859	510	32	69	2	2
Plainfield	0	9	0	0	0	0
Plainville	0	99	11	3	1	1
Plymouth	792	663	31	38	3	2
Plympton	0	39	0	2	0	0
Princeton	2	43	--[1]	1	0	0
Provincetown	0	18	5	2	0	0
Quincy	508	1,111	59	47	2	2
Randolph	0	382	33	15	2	2
Raynham	0	153	15	7	0	0
Reading	1	329	18	1	2	2
Rehoboth	0	111	9	4	0	0
Revere	0	628	57	46	2	1
Richmond	2	10	--[1]	0	0	0
Rochester	0	42	--[1]	0	0	0
Rockland	0	246	20	17	2	1
Rockport	0	66	5	3	1	1
Rowe	0	3	0	0	0	0
Rowley	0	82	--[1]	0	0	0
Royalston	0	10	0	1	0	0
Russell	0	18	--[1]	1	0	0
Rutland	0	90	5	2	1	1
Salem	1,742	505	40	49	5	5
Salisbury	0	110	10	13	0	0
Sandisfield	0	14	--[1]	0	0	0
Sandwich	1	231	16	1	0	0
Saugus	0	288	22	13	2	1
Savoy	0	7	0	0	0	0
Scituate	1	224	13	1	0	0
Seekonk	0	117	5	9	0	0
Sharon	2	214	15	0	1	0

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Sheffield	1	28	0	1	0	0
Shelburne	1	26	--[1]	1	0	0
Sherborn	0	61	0	0	0	0
Shirley	0	69	--[1]	5	1	0
Shrewsbury	1	457	21	4	5	5
Shutesbury	0	21	0	0	0	0
Somerset	1	139	10	18	0	0
Somerville	2	941	63	60	3	2
South Hadley	0	166	10	9	0	0
Southampton	0	56	6	1	0	0
Southborough	1	143	8	4	1	1
Southbridge	463	260	23	46	4	4
Southwick	0	108	6	7	1	1
Spencer	0	151	13	13	0	0
Springfield	5,925	2,368	234	470	21	15
Sterling	1	96	8	2	0	0
Stockbridge	0	14	--[1]	1	0	0
Stoneham	1,182	301	21	5	0	0
Stoughton	1	314	26	18	0	0
Stow	0	93	6	2	2	1
Sturbridge	1	98	6	1	1	0
Sudbury	1	261	13	2	1	1
Sunderland	0	40	5	4	0	0
Sutton	0	108	5	4	0	0
Swampscott	0	162	12	2	0	0
Swansea	0	142	9	14	0	0
Taunton	722	821	68	72	6	5
Templeton	0	81	--[1]	5	0	0
Tewksbury	1	396	25	9	2	2
Tisbury	3	35	--[1]	1	0	0
Tolland	0	3	0	0	0	0
Topsfield	0	61	5	0	0	0
Townsend	0	133	7	7	1	0
Truro	0	14	--[1]	0	0	0
Tyngsborough	0	169	12	3	0	0
Tyringham	0	1	0	0	0	0
Upton	1	110	11	2	2	1
Uxbridge	0	169	6	6	0	0
Wakefield	0	317	13	3	1	1
Wales	0	21	--[1]	1	0	0
Walpole	1	297	16	3	0	0
Waltham	308	706	53	26	4	4
Ware	235	117	6	15	2	1
Wareham	521	239	14	27	1	0
Warren	0	51	--[1]	6	0	0

Table 17A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 1998

Community	Occurrence Births	Resident Births	Low Birthweight	Teen Births, < 20 years	Infant Deaths	Neonatal Deaths
Warwick	0	8	0	0	0	0
Washington	0	5	--[1]	0	0	0
Watertown	2	394	20	6	0	0
Wayland	1	174	14	1	0	0
Webster	0	224	21	26	1	0
Wellesley	67	372	20	0	1	0
Wellfleet	0	21	--[1]	0	0	0
Wendell	0	13	0	1	0	0
Wenham	0	46	--[1]	0	1	1
West Boylston	0	66	--[1]	1	0	0
West Bridgewater	0	78	5	2	0	0
West Brookfield	0	37	--[1]	5	0	0
West Newbury	1	66	--[1]	0	0	0
West Springfield	0	337	22	34	1	0
West Stockbridge	0	10	--[1]	0	1	0
West Tisbury	0	17	--[1]	0	0	0
Westborough	0	248	13	5	3	3
Westfield	2	436	26	36	1	1
Westford	1	333	28	5	0	0
Westhampton	0	5	0	0	0	0
Westminster	0	74	8	9	0	0
Weston	0	122	--[1]	1	0	0
Westport	1	128	10	8	1	1
Westwood	0	176	8	1	0	0
Weymouth	3,470	696	50	27	4	3
Whately	0	15	--[1]	0	0	0
Whitman	0	188	10	11	0	0
Wilbraham	1	115	10	2	1	1
Williamsburg	0	21	0	1	0	0
Williamstown	0	45	--[1]	1	0	0
Wilmington	0	325	17	6	1	1
Winchendon	1	128	16	11	1	0
Winchester	2,139	291	13	0	0	0
Windsor	0	9	--[1]	0	0	0
Winthrop	0	196	10	3	0	0
Woburn	1	436	26	15	0	0
Worcester	6,186	2,417	188	338	17	15
Worthington	1	8	0	1	0	0
Wrentham	1	160	11	3	0	0
Yarmouth	0	217	15	17	4	4
Unknown	4	0	0	0	0	0

[1] Values of 1-4 for medical characteristics of communities with less than 200 births are suppressed based on Guidelines For Release Of Birth Data, Bureau of Health Statistics, Research and Evaluation.

Table 17B. Birth Characteristics, Occurrence and Resident Births and Infant Deaths by County, Massachusetts: 1998

County Name	Occurrence Births	Resident Births			Deaths	
		Number	Low Birthweight	Teen (< 20 years)	Infant	Neonatal
STATE TOTAL	82,216	81,406	5,655	5,902	414	315
Barnstable	1,657	2,050	131	108	11	7
Berkshire	1,356	1,298	81	118	6	4
Bristol	4,790	6,693	482	642	35	28
Dukes	117	162	15	4	1	1
Essex	8,350	9,598	602	819	50	35
Franklin	559	732	50	68	5	5
Hampden	6,414	5,963	468	880	39	30
Hampshire	1,167	1330	83	82	7	6
Middlesex	17,790	19,170	1,261	742	72	55
Nantucket	76	125	6	5	2	2
Norfolk	5,080	8,432	528	197	29	22
Plymouth	3,631	6,462	430	396	37	27
Suffolk	21,910	9,371	819	988	52	39
Worcester	9,315	10,020	699	853	68	54

Table 17C. Birth Characteristics, Occurrence and Resident Births and Infant Deaths, Massachusetts Community Health Network Areas (CHNAs): 1998

Community Health Network Area	Occurrence Births	Resident Births			Deaths	
		Number	Low Birthweight	Teen (< 20 years)	Infant	Neonatal
STATE TOTAL	82,216	81,406	5,655	5,902	414	315
Community Health Network of Berkshire	1,356	1,298	81	118	6	4
Upper Valley Health Web (Franklin County)	560	900	61	92	5	5
Partnership for Health in Hampshire County (Northampton)	1,167	1,308	81	80	7	6
The Community Health Connection (Springfield)	5,927	3,921	327	562	27	19
Greater Southbridge Community Health Network	468	1,454	121	145	11	9
Community Partners for Health (Milford)	615	2,333	145	99	11	6
Community Health Network of Greater Metro West (Framingham)	2,541	5,438	323	148	22	16
Community Wellness Coalition (Worcester)	6,191	3,842	278	372	33	28
Fitchburg/Gardner Community Health Network	2,045	3,339	228	264	14	10
Greater Lowell Community Health Network	2,829	4,046	306	308	15	12
Greater Lawrence Community Health Network	2,652	2,769	170	369	13	8
Greater Haverhill Community Health Network	1,305	1,983	115	118	7	5
Greater Beverly/Gloucester Community Health Network	2,647	1,303	61	45	8	6
North Shore Community Health Network	1,746	3,543	256	287	22	16
Greater Woburn/Concord/Littleton Community Health Network	3,560	2,607	141	45	7	5
North Suburban Health Alliance (Medford/Malden/Melrose)	2,814	3,363	240	94	20	16
Greater Cambridge/Somerville Community Health Network	1,928	3,186	211	107	8	6
West Suburban Health Network (Newton/Waltham)	4,188	2,991	168	44	8	6
Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	21,913	10,026	863	1000	52	39
Blue Hills Community Health Alliance (Quincy)	5,005	4,531	269	125	23	18
Four (For) Communities (Holyoke)	485	1,977	139	312	12	11
Greater Brockton Community Health Network	2,314	3,208	275	256	18	17
South Shore Community Partners in Prevention (Plymouth)	794	2,470	132	106	10	8
Health & Education Response (Attleboro/Taunton)	1,532	3,419	236	196	20	14
Partners for a Healthier Community (Fall River)	1,620	1,513	130	196	9	9
Greater New Bedford Community Health Network	2,160	2,301	146	297	12	6
Cape and Islands Community Health Network	1,850	2,337	152	117	14	10

APPENDIX

TECHNICAL NOTES

1. DATA CAUTIONS:

Limitations of small numbers:
Cells in some tables in this publication, and particularly those tables specific to the individual cities and towns, contain small numbers. Rates and proportions based upon less than five observations are suppressed, and trends based upon small numbers should be interpreted cautiously.

Differences with previously published data
Numbers and rates in this publication may differ from those contained in previous reports because of updates of birth and death certificate files, and the use of updated population estimates for 1991-1997 produced by the Massachusetts Institute for Social and Economic Research (MISER) in 1999. (See Section 2 for details)

Self-reported data
Many items used in this publication, such as maternal smoking, and type of health insurance coverage, are self-reported, and are subject to the usual limitations of this type of information.

2. CHANGES IN THE POPULATION ESTIMATES THAT AFFECT BIRTH RATES

Population estimates

In this year's publication, updated population data for denominators were used for years 1991-1997, and thus, all population based birth rates for 1991-1998 have been affected.

The best source of population data is the US Census, which is conducted every ten years. The US Census is a count of the number of people living in the US. The 1990 Census is the most recent year for which Census data are available. However, since the population changes, 1990 Census data do not accurately reflect the 1998 population. Therefore, it is necessary to estimate the population for intercensal years.

In previous publications, linear extrapolations from the 1990 and 1995 data were used to estimate the 1996 and 1997 populations. The linear extrapolation method is not capable of capturing specific, local changes.

Beginning with Advance Data: Deaths 1998 and Advance Data: Births 1998, the Massachusetts Institute for Social and Economic Research (MISER) is the source for all population estimates. MISER is the US Census designated state data center for the Commonwealth.

The new MISER methodology more closely reflects the dynamics of population changes, such as the influx of immigrants during the 1990s, internal migration, the large college populations that come and go, and specific local events (e.g., the closing of Fort Devens). Using the 1990 US Census is used as the base population, MISER captures annual population change through a variety of data sources such as: MDPH birth data, MDPH death data, Immigration and

Naturalization Service (INS) data, School Attending Children data, College enrollment data, and tax revenue data.

Impact on the calculation of birth rates

For the state as a whole, the new population estimates are higher for females ages 15-19 years old (19% higher for 1997) and 15-44 years old (2% higher in 1997) compared to the previously used estimates. When the denominator increases and the numerator stays the same, the overall rate decreases (see Figures 1 and 2). However, population changes tend to "wash out" at the state level, since some towns experience growth and others experience decline. The effects of population change are greater at the town level. (Detailed town level teen birth data will be published soon in Adolescent Births, 1998).

The figures below show the effect on the birth rates when the new estimates (solid line) are used as denominators, compared to the old population estimates (dotted line), for estimating the teen birth rate (Figure 1) and the fertility rate (Figure 2) in Massachusetts from 1990 to 1998.

Figure 1. Massachusetts Teen Birth Rate, 1990-1998

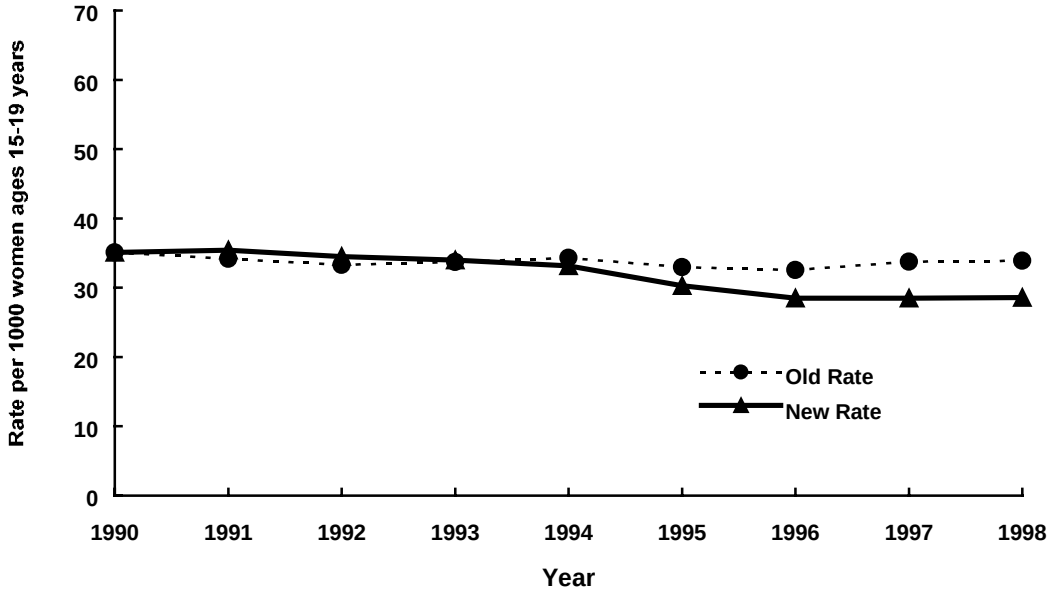
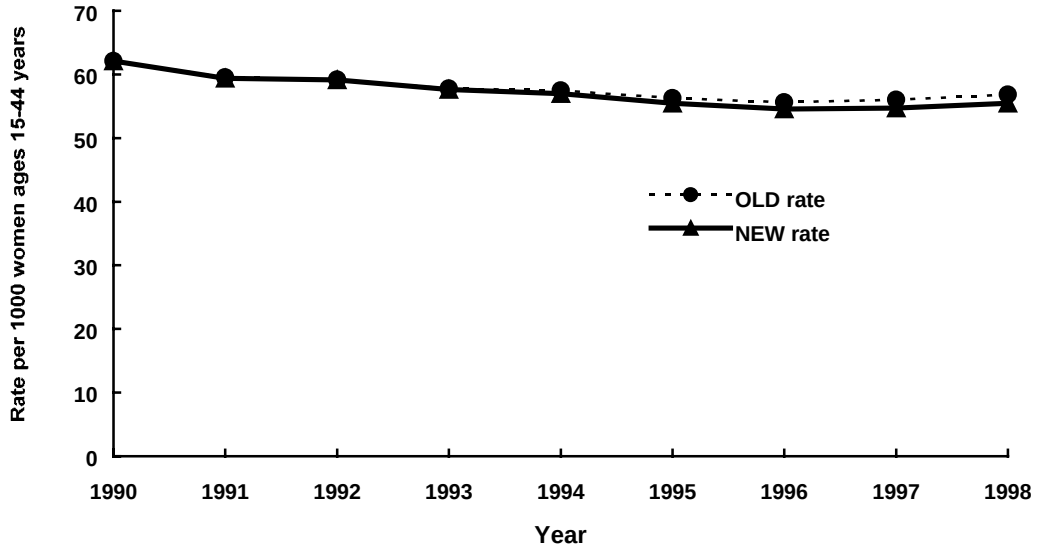


Figure 2. Massachusetts Fertility Rate, 1990-1998



3. CHANGES IN THE COLLECTION OF RACE AND ETHNICITY INFORMATION

Assignment of an Infant's Race/Ethnicity

Prior to 1989, the race/ethnicity of an infant was assigned by combining information on the race/ethnicity of the mother and the race/ethnicity of the father. Since 1989, Massachusetts has followed the recommendation of the National Center for Health Statistics of classifying births according to the self-reported race/ethnicity of the mother. Therefore, beginning in 1989, the race/ethnicity of an infant is identical to the self-reported race/ethnicity of the infant's mother.

Addition of Information on Hispanic Ethnicity

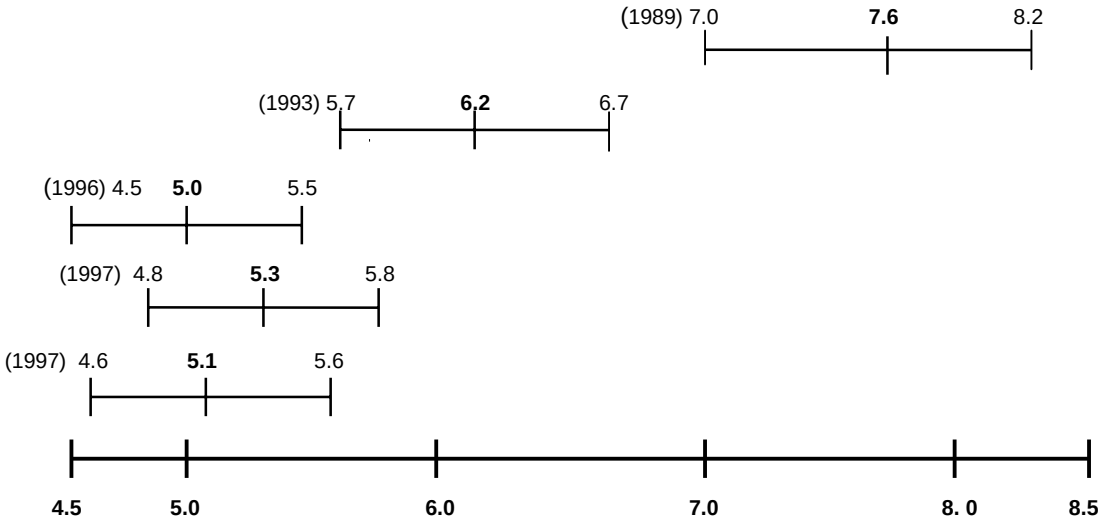
Beginning in 1986, an identifier for Hispanic ethnicity was added to the birth certificate; in 1989, an identifier for Hispanic ethnicity was added to the death certificate. Prior to these changes, most Hispanics were included with whites and it was not possible to accurately calculate Hispanic-specific rates of natality and mortality.

CONFIDENCE INTERVALS AND INFANT MORTALITY RATES

Beginning in the 1992 Advance Data: Births publication, 95% confidence intervals were added to the calculation of infant mortality rates (IMRs). The confidence interval (CI) provides a measure of stability of the IMR and a basis for comparing rates to determine if they are statistically different. Rates can be compared for the same group in different years, or for different groups in the same year. The width of the CI reflects the stability of the IMR. For example, a narrow CI reflects high stability, and a wide interval reflects low stability. If the CIs around two IMRs being compared do not overlap, the difference between the two rates is statistically significant. The following table and chart illustrate the concept of statistically significant differences using actual data from 1989 and 1992-1998.

Comparison of Infant Mortality Rates and Confidence Intervals for Selected Years

Year	IMR (per 1,000 births)	95% Confidence Interval
1989	7.6	(7.0-8.2)
1992	6.5	(6.0-7.0)
1993	6.2	(5.7-6.7)
1994	6.0	(5.4-6.5)
1995	5.1	(4.6-5.6)
1996	5.0	(4.5-5.5)
1997	5.3	(4.8-5.8)
1998	5.1	(4.6-5.6)



Infant Deaths Per 1,000 Live Births

The difference between the 1993 IMR and 1996 IMR is statistically significant -- the confidence intervals do not overlap. The same is true for the differences between the 1989 IMR and the annual IMRs for 1993, 1996, 1997, and 1998.

95% Confidence Intervals for Infant Mortality Rates, by Race and Hispanic Ethnicity, Massachusetts: 1990-1998

	Total[1]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian	
Year	#	**Rate**[2] (C.I).	#	**Rate**[2](C.I).	#	**Rate**[2](C.I).	#	**Rate**[2](C.I).	#	**Rate**[2](C.I).
1990	649	**7.0** (6.5, 7.5)	442	**6.1** (5.5, 6.7)	98	**13.7** (11.0, 16.4)	77	**9.1** (7.1, 11.1)	24	**7.0** (4.2, 10.0)
1991	577	**6.5** (6.0, 7.0)	381	**5.5** (4.9, 6.1)	101	**15.0** (12.1, 17.9)	80	**9.4** (7.3, 11.5)	14	**4.2** (2.0, 6.4)
1992	569	**6.5** (6.0, 7.0)	371	**5.5** (4.9, 6.1)	110	**16.4** (13.4, 19.4)	67	**7.9** (6.0, 9.8)	16	**4.9** (2.5, 7.3)
1993	523	**6.2** (5.7, 6.7)	346	**5.3** (4.7, 5.9)	84	**13.1** (10.3, 15.9)	77	**9.3** (7.2, 11.4)	13	**3.9** (1.8, 6.0)
1994	499	**6.0** (5.4, 6.5)	343	**5.3** (4.7, 5.9)	79	**12.6** (9.8, 15.4)	64	**7.6** (5.7, 9.4)	8	**2.4** (0.7, 4.0)
1995	419	**5.1** (4.6, 5.6)	275	**4.4** (3.8, 4.9)	65	**11.1** (8.4, 13.8)	58	**7.2** (5.3, 9.0)	19	**5.5** (3.0, 8.0)
1996	403	**5.0** (4.5, 5.5)	289	**4.7** (4.1, 5.2)	63	**11.4** (8.6, 14.2)	40	**5.1** (3.5, 6.7)	8	**2.2** (0.7, 3.7)
1997	425	**5.3** (4.8, 5.8**)**	294	**4.8** (4.2, 5.3**)**	64	**11.7** (8.8, 14.5)	55	**6.7** (4.9, 8.4)	10	**2.6** (1.0, 4.2)
1998	414	**5.1** (4.6, 5.6**)**	294	**4.6** (4.1, 5.2**)**	64	**10.6** (7.9, 13.3)	55	**6.7** (5.0, 8.4)	10	**2.7** (1.0, 4.3)

[1]Deaths of infants of unknown race are excluded except for the total calculation. For rate computations, births of infants of unknown race are allocated into the race categories according to the distribution of births of known race.
[2]Rates are expressed per 1,000 live births.

In 1998, the black non-Hispanic infant mortality rate was 10.6 deaths per 1,000 live births (95% CI: 7.9,13.3), which was 2.3 times greater than the white non-Hispanic infant mortality rate of 4.6 (95% CI: 4.1, 5.2). The difference in these two rates was statistically significant. The rate of infant mortality for black non-Hispanics was also significantly elevated compared to Asians in 1998.

DEFINITION OF RATES

Age-Specific Birth Rate

The number of children born to women in a specific age group divided by the population of women in that specific age group, multiplied by 1,000. (Also see Crude Birth Rate, Fertility Rate, and Teen Birth Rate)

Birth rate = $\frac{\text{Number of resident live births}}{\text{Total resident population}} \times 1{,}000$

Cesarean Section Rates

Total C-section rate = $\frac{\text{Number of C-section births}}{\text{Number of occurrence births}} \times 100$

Primary C-section rate = $\frac{\text{Number of primary C-section births}}{\text{Number of occurrence births-(number of repeat C-section births+VBACs)]}} \times 100$

Repeat C-section rate = $\frac{\text{Number of repeat C-section births}}{\text{(Number of repeat C-section births+number of VBACs)}} \times 100$

VBAC rate = $\frac{\text{Number of VBACs}}{\text{(Number of repeat C-section births+number of VBACs)}} \times 100$

NOTE: the rates presented in Table 16 are for occurrence births but can be calculated for resident births as well. VBAC: Vaginal birth after Cesarean section.

Crude Birth Rate

The number of births in a year divided by the population, multiplied by 1,000.

Fertility Rate

Fertility rate = $\frac{\text{Number of births to females ages 15-44 years}}{\text{Number of females ages 15-44 years in the population}} \times 1{,}000$

General Fertility Ratio

Same as Fertility Rate.

Infant Mortality Rate (IMR)
The death rate among infants less than one year old, per 1,000 live births.

$$\text{Infant Mortality Rate} = \frac{\text{Number of resident deaths in a year of infants less than one year old}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Neonatal Mortality Rate (NMR)
The death rate among infants under 28 days of age, per 1,000 live births.

$$\text{Neonatal Mortality Rate} = \frac{\text{Number of resident deaths in a year of infants less than 28 days of age}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Post Neonatal Mortality Rate
The death rate among infants 28 days of age to less than one year old, per 1,000 live births.

$$\text{Post Neonatal Mortality Rate} = \frac{\text{Number of resident deaths in a year of infants 28 days of age to less than one year of age}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Teen Birth Rate

$$\text{Teen birth rate} = \frac{\text{Number of births to females ages 15-19 years old}}{\text{Number of females ages 15-19 years old in the population}} \times 1{,}000$$

Total Rate of Change
The total rate of change is calculated as follows:

$$\frac{Pn-Po}{Po} \times 100$$

where

Pn = rate during later time period
Po = rate during earlier time period

Population Estimates for Massachusetts Communities, 1997

TOWN NAME	COUNTY	CHNA	POPULATION
Abington	Plymouth	22	15,061
Acton	Middlesex	15	20,652
Acushnet	Bristol	26	10,289
Adams	Berkshire	1	9,308
Agawam	Hampden	4	30,146
Alford	Berkshire	1	458
Amesbury	Essex	12	16,347
Amherst	Hampshire	3	45,806
Andover	Essex	11	30,971
Arlington	Middlesex	17	42,486
Ashburnham	Worcester	9	6,228
Ashby	Middlesex	9	2,522
Ashfield	Franklin	2	1,817
Ashland	Middlesex	7	13,972
Athol	Worcester	2	11,123
Attleboro	Bristol	24	38,834
Auburn	Worcester	8	15,921
Avon	Norfolk	22	5,258
Ayer	Middlesex	9	5,013
Barnstable	Barnstable	27	45,912
Barre	Worcester	9	4,898
Becket	Berkshire	1	1,541
Bedford	Middlesex	15	13,609
Belchertown	Hampshire	3	12,424
Bellingham	Norfolk	6	15,771
Belmont	Middlesex	17	25,407
Berkley	Bristol	24	5,113
Berlin	Worcester	9	2,440
Bernardston	Franklin	2	2,165
Beverly	Essex	13	41,016
Billerica	Middlesex	10	38,145
Blackstone	Worcester	6	9,057
Blandford	Hampden	4	1,257
Bolton	Worcester	9	4,107
Boston	Suffolk	19	560,741
Bourne	Barnstable	27	16,130
Boxborough	Middlesex	15	4,776
Boxford	Essex	12	7,772
Boylston	Worcester	8	3,910
Braintree	Norfolk	20	35,299
Brewster	Barnstable	27	10,408
Bridgewater	Plymouth	22	23,985
Brimfield	Hampden	5	3,104
Brockton	Plymouth	22	91,410
Brookfield	Worcester	5	2,921
Brookline	Norfolk	19	59,664
Buckland	Franklin	2	1,958
Burlington	Middlesex	15	24,081
Cambridge	Middlesex	17	102,211
Canton	Norfolk	20	20,202
Carlisle	Middlesex	15	4,361
Carver	Plymouth	23	11,233
Charlemont	Franklin	2	1,106
Charlton	Worcester	5	11,437
Chatham	Barnstable	27	6,702
Chelmsford	Middlesex	10	35,528
Chelsea	Suffolk	19	30,102
Cheshire	Berkshire	1	3,811
Chester	Hampden	21	1,273
Chesterfield	Hampshire	3	1,067
Chicopee	Hampden	21	56,571
Chilmark	Dukes	27	746
Clarksburg	Berkshire	1	1,767
Clinton	Worcester	9	13,614
Cohasset	Norfolk	20	7,321
Colrain	Franklin	2	1,888
Concord	Middlesex	15	18,922
Conway	Franklin	2	1,666
Cummington	Hampshire	3	828
Dalton	Berkshire	1	7,500
Danvers	Essex	14	25,341
Dartmouth	Bristol	26	28,742
Dedham	Norfolk	18	23,867
Deerfield	Franklin	2	5,297
Dennis	Barnstable	27	14,395
Dighton	Bristol	24	6,077
Douglas	Worcester	6	7,029
Dover	Norfolk	18	5,938
Dracut	Middlesex	10	27,913
Dudley	Worcester	5	9,655
Dunstable	Middlesex	10	2,832
Duxbury	Plymouth	23	14,620
East Bridgewater	Plymouth	22	12,723
East Brookfield	Worcester	5	2,104
East Longmeadow	Hampden	4	14,546
Eastham	Barnstable	27	4,792
Easthampton	Hampshire	3	16,674
Easton	Bristol	22	21,586
Edgartown	Dukes	27	3,630
Egremont	Berkshire	1	1,200
Erving	Franklin	2	1,399
Essex	Essex	13	3,294
Everett	Middlesex	16	36,545
Fairhaven	Bristol	26	16,389
Fall River	Bristol	25	89,246
Falmouth	Barnstable	27	29,702
Fitchburg	Worcester	9	37,864
Florida	Berkshire	1	793
Foxborough	Norfolk	7	16,280
Framingham	Middlesex	7	64,503
Franklin	Norfolk	6	26,117
Freetown	Bristol	26	8,702
Gardner	Worcester	9	20,619
Gay Head (Aquinnah)	Dukes	27	184
Georgetown	Essex	12	7,512
Gill	Franklin	2	1,499
Gloucester	Essex	13	27,960
Goshen	Hampshire	3	987
Gosnold	Dukes	27	201
Grafton	Worcester	8	13,877
Granby	Hampshire	3	6,262
Granville	Hampden	4	1,584
Great Barrington	Berkshire	1	8,354
Greenfield	Franklin	2	18,811
Groton	Middlesex	9	9,277
Groveland	Essex	12	5,769
Hadley	Hampshire	3	4,617
Halifax	Plymouth	23	6,961
Hamilton	Essex	13	7,649
Hampden	Hampden	4	4,851
Hancock	Berkshire	1	709
Hanover	Plymouth	23	12,668
Hanson	Plymouth	23	9,770
Hardwick	Worcester	9	2,590
Harvard	Worcester	9	11,128
Harwich	Barnstable	27	11,290
Hatfield	Hampshire	3	3,462
Haverhill	Essex	12	55,547
Hawley	Franklin	2	313
Heath	Franklin	2	833
Hingham	Plymouth	20	21,752
Hinsdale	Berkshire	1	2,147
Holbrook	Norfolk	22	10,974
Holden	Worcester	8	16,010

Population Estimates for Massachusetts Communities, 1997, continued

TOWN NAME	COUNTY	CHNA	POPULATION	TOWN NAME	COUNTY	CHNA	POPULATION
Holland	Hampden	5	2,261	New Marlborough	Berkshire	1	1,686
Holliston	Middlesex	7	14,639	New Salem	Franklin	2	898
Holyoke	Hampden	21	38,092	Newbury	Essex	12	6,185
Hopedale	Worcester	6	5,819	Newburyport	Essex	12	16,670
Hopkinton	Middlesex	7	10,850	Newton	Middlesex	18	83,886
Hubbardston	Worcester	9	3,303	Norfolk	Norfolk	7	9,818
Hudson	Middlesex	7	18,832	North Adams	Berkshire	1	18,844
Hull	Plymouth	20	10,817	North Andover	Essex	11	23,819
Huntington	Hampshire	21	2,463	North Attleboro	Bristol	24	27,487
Ipswich	Essex	13	11,806	North Brookfield	Worcester	5	5,011
Kingston	Plymouth	23	10,083	North Reading	Middlesex	16	12,695
Lakeville	Plymouth	24	8,779	Northampton	Hampshire	3	31,784
Lancaster	Worcester	9	7,038	Northborough	Worcester	7	13,361
Lanesborough	Berkshire	1	3,212	Northbridge	Worcester	6	13,316
Lawrence	Essex	11	69,220	Northfield	Franklin	2	3,259
Lee	Berkshire	1	5,490	Norton	Bristol	24	15,018
Leicester	Worcester	8	10,804	Norwell	Plymouth	20	9,691
Lenox	Berkshire	1	5,197	Norwood	Norfolk	20	29,690
Leominster	Worcester	9	41,236	Oak Bluffs	Dukes	27	3,238
Leverett	Franklin	2	2,014	Oakham	Worcester	9	1,650
Lexington	Middlesex	15	31,549	Orange	Franklin	2	7,435
Leyden	Franklin	2	742	Orleans	Barnstable	27	6,559
Lincoln	Middlesex	15	7,522	Otis	Berkshire	1	1,231
Littleton	Middlesex	15	7,686	Oxford	Worcester	5	13,609
Longmeadow	Hampden	4	16,444	Palmer	Hampden	4	12,741
Lowell	Middlesex	10	104,270	Paxton	Worcester	8	4,283
Ludlow	Hampden	21	19,741	Peabody	Essex	14	50,877
Lunenburg	Worcester	9	10,028	Pelham	Hampshire	3	1,462
Lynn	Essex	14	79,589	Pembroke	Plymouth	23	15,911
Lynnfield	Essex	14	12,080	Pepperell	Middlesex	9	10,979
Malden	Middlesex	16	51,486	Peru	Berkshire	1	836
Manchester	Essex	13	5,399	Petersham	Worcester	2	1,211
Mansfield	Bristol	24	19,759	Phillipston	Worcester	2	1,673
Marblehead	Essex	14	21,260	Pittsfield	Berkshire	1	48,652
Marion	Plymouth	26	6,653	Plainfield	Hampshire	3	587
Marlborough	Middlesex	7	34,045	Plainville	Norfolk	7	7,345
Marshfield	Plymouth	23	22,983	Plymouth	Plymouth	23	49,895
Mashpee	Barnstable	27	9,778	Plympton	Plymouth	23	2,744
Mattapoisett	Plymouth	26	5,946	Princeton	Worcester	9	3,414
Maynard	Middlesex	7	10,357	Provincetown	Barnstable	27	3,241
Medfield	Norfolk	7	12,389	Quincy	Norfolk	20	84,989
Medford	Middlesex	16	56,134	Randolph	Norfolk	20	31,669
Medway	Norfolk	6	11,933	Raynham	Bristol	24	11,009
Melrose	Middlesex	16	26,727	Reading	Middlesex	16	24,146
Mendon	Worcester	6	4,398	Rehoboth	Bristol	24	9,812
Merrimac	Essex	12	5,674	Revere	Suffolk	19	44,121
Methuen	Essex	11	42,644	Richmond	Berkshire	1	2,000
Middleborough	Plymouth	24	19,437	Rochester	Plymouth	26	4,355
Middlefield	Hampshire	3	475	Rockland	Plymouth	23	17,386
Middleton	Essex	11	5,266	Rockport	Essex	13	8,346
Milford	Worcester	6	23,877	Rowe	Franklin	2	356
Millbury	Worcester	8	12,695	Rowley	Essex	12	5,160
Millis	Norfolk	7	7,440	Royalston	Worcester	2	926
Millville	Worcester	6	2,840	Russell	Hampden	4	1,886
Milton	Norfolk	20	27,383	Rutland	Worcester	9	5,911
Monroe	Franklin	2	165	Salem	Essex	14	40,784
Monson	Hampden	4	7,951	Salisbury	Essex	12	6,921
Montague	Franklin	2	7,342	Sandisfield	Berkshire	1	642
Monterey	Berkshire	1	885	Sandwich	Barnstable	27	18,246
Montgomery	Hampden	4	746	Saugus	Essex	14	25,593
Mt. Washington	Berkshire	1	135	Savoy	Berkshire	1	692
Nahant	Essex	14	4,092	Scituate	Plymouth	20	17,325
Nantucket	Nantucket	27	7,500	Seekonk	Bristol	24	14,093
Natick	Middlesex	7	30,855	Sharon	Norfolk	20	16,300
Needham	Norfolk	18	27,485	Sheffield	Berkshire	1	3,313
New Ashford	Berkshire	1	214	Shelburne	Franklin	2	1,910
New Bedford	Bristol	26	96,835	Sherborn	Middlesex	7	4,595
New Braintree	Worcester	9	909	Shirley	Middlesex	9	6,295

Population Estimates for Massachusetts Communities, 1997, continued

TOWN NAME	COUNTY	CHNA	POPULATION	TOWN NAME	COUNTY	CHNA	POPULATION
Shrewsbury	Worcester	8	27,171	Warwick	Franklin	2	755

Shutesbury	Franklin	2	1,957	Washington	Berkshire	1	652
Somerset	Bristol	25	19,151	Watertown	Middlesex	17	26,734
Somerville	Middlesex	17	78,535	Wayland	Middlesex	7	12,889
South Hadley	Hampshire	3	20,052	Webster	Worcester	5	16,090
Southampton	Hampshire	3	5,430	Wellesley	Norfolk	18	28,688
Southborough	Worcester	7	7,804	Wellfleet	Barnstable	27	2,458
Southbridge	Worcester	5	18,460	Wendell	Franklin	2	1,139
Southwick	Hampden	4	8,835	Wenham	Essex	13	4,579
Spencer	Worcester	5	11,789	West Boylston	Worcester	8	6,899
Springfield	Hampden	4	141,908	West Bridgewater	Plymouth	22	6,830
Sterling	Worcester	9	7,186	West Brookfield	Worcester	5	3,623
Stockbridge	Berkshire	1	2,819	West Newbury	Essex	12	3,973
Stoneham	Middlesex	16	21,693	West Springfield	Hampden	4	29,196
Stoughton	Norfolk	22	28,143	West Stockbridge	Berkshire	1	1,292
Stow	Middlesex	7	6,193	West Tisbury	Dukes	27	2,340
Sturbridge	Worcester	5	7,503	Westborough	Worcester	7	16,798
Sudbury	Middlesex	7	16,125	Westfield	Hampden	21	43,491
Sunderland	Franklin	2	3,256	Westford	Middlesex	10	19,369
Sutton	Worcester	6	7,678	Westhampton	Hampshire	3	1,569
Swampscott	Essex	14	14,827	Westminster	Worcester	9	6,316
Swansea	Bristol	25	16,156	Weston	Middlesex	18	11,905
Taunton	Bristol	24	51,745	Westport	Bristol	25	14,933
Templeton	Worcester	9	6,706	Westwood	Norfolk	18	13,949
Tewksbury	Middlesex	10	29,913	Weymouth	Norfolk	20	54,606
Tisbury	Dukes	27	3,510	Whately	Franklin	2	1,243
Tolland	Hampden	4	203	Whitman	Plymouth	22	13,649
Topsfield	Essex	13	6,257	Wilbraham	Hampden	4	13,349
Townsend	Middlesex	9	9,300	Williamsburg	Hampshire	3	2,673
Truro	Barnstable	27	1,722	Williamstown	Berkshire	1	8,424
Tyngsborough	Middlesex	10	9,635	Wilmington	Middlesex	15	19,585
Tyringham	Berkshire	1	559	Winchendon	Worcester	9	9,003
Upton	Worcester	6	4,839	Winchester	Middlesex	15	21,134
Uxbridge	Worcester	6	10,902	Windsor	Berkshire	1	899
Wakefield	Middlesex	16	24,723	Winthrop	Suffolk	19	18,255
Wales	Hampden	5	1,589	Woburn	Middlesex	15	36,670
Walpole	Norfolk	7	22,561	Worcester	Worcester	8	167,877
Waltham	Middlesex	18	61,260	Worthington	Hampshire	3	1,428
Ware	Hampshire	3	10,566	Wrentham	Norfolk	7	10,295
Wareham	Plymouth	26	19,680	Yarmouth	Barnstable	27	22,760
Warren	Worcester	5	4,869				

1. 1997 MISER population estimates (released in November 1999).

Population Estimates for Massachusetts
Community Health Network Areas (CHNA) and Counties, 1997[1]

CHNA	POPULATION
1. Community Health Network of Berkshire	139,534
2. Upper Valley Health Web (Franklin County)	86,725
3. Greater Holyoke Area	156,320
4. Greater Springfield Community Health Network	289,271
5. Greater Southbridge Area	113,140
6. Community Partners for Health (Milford Area)	147,599
7. Greater Framingham	362,270
8. Community Wellness Coalition (Worcester Area)	279,818
9. Fitchburg/Gardner Area Community Health Network	256,816
10. Greater Lowell Community Health Network	268,276
11. Greater Lawrence Area	174,449
12. Greater Haverhill Area	138,389
13. Beverly/Gloucester Area	117,320
14. North Shore Community Health Network	274,579
15. Greater Woburn/Concord/Littleton	210,556
16. Medford/Malden/Melrose Area	254,911
17. Cambridge/Somerville Area	274,008
18. West Suburban Health Network (Newton/Waltham)	258,243
19. City of Boston/Chelsea/Revere/Winthrop	706,588
20. Blue Hills Community Health Alliance (Quincy Area)	363,531
21. Hampshire County Partnership for Health	158,434
22. Greater Brockton Community Health Network	229,083
23. South Shore Community Partners in Prevention (Greater Plymouth Area)	174,915
24. Greater Attleboro/Taunton Area	230,976
25. Partners for a Healthier Community (Fall River Area)	138,244
26. Greater New Bedford Area	198,429
27. Cape and Islands Community Health Network	225,198

COUNTY	POPULATION
Barnstable	203,694
Berkshire	139,534
Bristol	524,030
Dukes	14,050
Essex	704,737
Franklin	71,416
Hampden	452,688
Hampshire	158,575
Middlesex	1,450,533
Nantucket	7,454
Norfolk	648,969
Plymouth	462,230
Suffolk	647,682
Worcester	742,030
STATE	**6,227,622**

1. 1997 population estimates from MISER (released in November 1999).

GLOSSARY

Adequacy of Prenatal Care

The Index of Adequacy of Prenatal Care (based on the Kessner Index) has five categories (adequate, intermediate, inadequate, no prenatal care, and unknown), based on the trimester in which prenatal care began and the number of prenatal visits. The general classification scheme for full-term infants is as follows:

Category	Trimester Care Began	Number of Visits
Adequate	1	9 or more
Intermediate	1	5-8
	2	5 or more
Inadequate	1	1-4
	2	1-4
	3	1 or more
No prenatal care	--	0
Unknown	Unknown	unknown

This classification is adjusted for gestational age to allow for proper classification of premature births.

Birthweight

The weight of an infant recorded at the time of delivery. It may be recorded in either pounds/ounces or grams. If recorded in pounds/ounces, it is converted to grams for use in this report.

1 pound = 453.6 grams
1,000 grams = 2 pounds and 3 ounces

Birthweight Categories

Normal birthweight (NBW):	An infant's weight of 2,500 grams (approximately 5.5 pounds) or more recorded at birth.
Low birthweight (LBW):	An infant's weight of less than 2,500 grams (5.5 pounds) recorded at birth.
Very low birthweight (VLBW):	An infant's weight of less than 1,500 grams (3.3 pounds) recorded at birth.

Cesarean Section or C-Section

Primary: A mother's first Cesarean section delivery.
Repeat: A Cesarean delivery that has been preceded by at least one Cesarean delivery.

Community Health Network Areas (CHNAs)

The Department of Public Health, in collaboration with health service providers, coalition members, and interested citizens, has designated 27 areas for community health planning. It is the Department's intention to foster in each of these areas the development of Community Health Networks -- consortia of health care providers, human service agencies, schools, churches, youth, parents, elders, advocacy groups, and individual consumers -- to address the

health needs of the community. These community coalitions will participate in monitoring outcomes and progress of strategies and responses to those health needs.

It is hoped the Networks will mobilize around key health issues impacting the community, promote prevention efforts, enhance access to care, provide opportunities for more collaboration among agencies, and create a client-centered, outcome-oriented health service delivery system. Community Health Networks will also promote efficiency in service delivery by working to reduce duplication and overlap, and by identifying gaps, in service.

A Community Health Network Area (CHNA) is defined as an aggregation of cities and towns. (The city of Boston constitutes its own Community Health Network area). In the current publication, we have presented some data by CHNA. To determine which cities and towns make up a particular CHNA, the table on pages 90-92 provides the appropriate CHNA code for each city and town.

The data published in this volume reflect the new definitions of CHNAs instituted in January 1997 and the new CHNA names.

Confidence Intervals

The confidence interval (CI) for the infant mortality rate (IMR) is a range of values that has a 95% chance of including the underlying risk of an infant death. Observed rates are subject to statistical variation; even if the underlying risk of infant death is identical in two subpopulations, the observed IMRs for the subpopulations may differ because of random variation. The confidence interval describes the precision of observed IMR as an estimate of the underlying risk of infant death, with a wider interval indicating less certainty about this estimate. The width of the interval reflects the size of the subpopulation and the number of infant deaths; smaller subpopulations with fewer infant deaths lead to wider confidence intervals.

Ethnicity

See the section in the Appendix entitled: Changes in the Collection of Race and Ethnicity Information.

Foreign-Born Women

Women not born in the United States, its possessions or protectorates. Women born in Puerto Rico, the US Virgin Islands, and Guam are not foreign-born.

Gravidity

The number of pregnancies experienced by a woman.

Healthy Start

A Massachusetts-funded program providing services and financing for prenatal care to low-income pregnant women who lack health insurance, but do not qualify for Medicaid.

ICD-9

ICD is the abbreviation for the International Classification of Diseases. The ICD classifies mortality information for statistical purposes. The ICD was first used in 1900, and has since

been revised about every 10 years. The Ninth Revision, published in 1977, is used to code mortality data beginning in 1979.

Infant
A child whose age is less than one year (365 days).

Infant Death
Death of a child whose age is less than one year.

Live Birth
A live birth is any infant who breathes or shows any other evidence of life (such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles) after separation from the mother's uterus, regardless of the duration of gestation.

Low Birthweight (LBW)
See Birthweight Categories.

Neonatal
Infants under 28 days of age.

Neonatal Death
Death of a child whose age is less than 28 days.

Occurrence Birth
A birth occurring in the Commonwealth of Massachusetts, regardless of the residency of the mother. For individual cities/towns, an occurrence birth represents any birth occurring in that city/town, regardless of the residence of the mother. See Resident Birth.

Parity
The total number of live infants ever born to a woman, including the current birth.

Plurality
The number of births to a woman produced in the same gestational period. A singleton is the birth of one infant, twins represent the births of two infants, etc.

Post Neonatal
A child whose age is at least 28 days, but less than one year.

Post Neonatal Death
Death of a child whose age is at least 28 days, but less than one year.

Race

See the section in the Appendix entitled: Changes in the Collection of Race and Ethnicity Information.

Resident Birth
The birth of an infant whose mother reports her usual place of residence is in Massachusetts. In Massachusetts, a resident is a person with a permanent address in one of the 351 cities or towns. Vital statistics data may be presented in terms either of residence or occurrence. All data in this publication, except the data in Table 13, are resident data. Resident data include all events that occur to residents of the Commonwealth, wherever they occur. Occurrence data include all events that occur within the state, whether to residents or nonresidents. There is an exchange agreement among the 50 states, District of Columbia, Puerto Rico, Virgin Islands, Guam, and Canada that provides for exchange of copies of birth and death records. These records are used for statistical purposes only, and allow each state or province to track the births and deaths of its residents.

Vaginal Birth After Cesarean (VBAC)
A vaginal delivery of an infant to a mother who has had at least one prior Cesarean section delivery.

Very Low Birthweight (VLBW)
See Birthweight Categories.

Massachusetts Birth Certificate: 1998

Advance Data: Births 1998 Evaluation Form

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